

Scanning - Shortwave - Ham Radio
Equipment - Computers - Antique Radio

Monitoring Times

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HOW TO SCAN FOR FIRE TONES

Broadcasts from Iran
Broadcast Satellites 2006
Review: Eton's E5 Portable



AOR, the Authority on Radio Makes MORE Than Great Radios!

Discover these Accessories & Add to your Capabilities.



DA3000

Antennas for the Great Outdoors

DA3000: a 16 element receive wideband discone antenna with useable frequency coverage from 25MHz to 2GHz. Using different length elements to ensure true wideband characteristics, the DA3000 also includes one 'loaded' element to enhance low frequency performance. Engineered and manufactured to AOR's exacting standards, the DA3000 comes with 50 feet of quality RG58/U coaxial cable terminated in a BNC plug for the radio connection and a low-loss TNC plug in the antenna base. Pole clamps are also standard.

Designed for areas where space is a problem or when an "unobtrusive" installation is essential, **SA7000** is a super wideband coverage receive antenna with useable frequency coverage of 30 KHz to 2 GHz. The SA7000 is a passive arrangement with two whip elements: a long element for short wave up to 30 MHz and a second shorter loaded whip antenna for frequencies up to 2 GHz. The loading coils are tuned around 150 & 800 MHz to enhance VHF & UHF performance.



SA7000

Antennas for Indoor Enjoyment

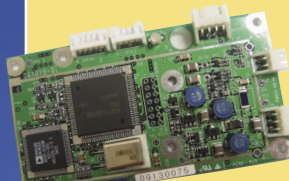
AOR has made performance even better with the new **LA380** indoor antenna as successor to the popular LA350. The LA380 features full frequency coverage (40KHz - 500MHz) using a single receiving element. Designed to provide reception when away from the main monitoring location or when large external antennas are not practical, the LA380 is a compact active (1 foot diameter) loop antenna which features an

internal high-gain amplifier (20dB for 40KHz-250MHz) and excellent overall strong signal handling (high IP3 +10dBm). The loop design allows directional control and nulling noise or interference. Perfect for listening in remote locations or in antenna-restricted areas.



LA380

Accessories for Added Monitoring Capability



P25-8600
APC025 Decoder

Now you can monitor APCO 25 signals using an AR8600MKII. The **P25-8600 APC025 Decoder** can be installed in the AR8600MKII receiver to automatically decode the APCO25 signal. The decoded audio is then output from the receiver's speaker. (Installation is required.)

The **TV5000A NTSC TV Internal Converter** adds the ability to receive broadcast television signals (NTSC) and allow monitoring video feeds from a variety of sources including broadcast TV channels, public safety agencies, aircraft, Amateur Radio FSTV, news media video and more when used with AOR AR5000A series of communications receivers.



TV5000A NTSC
TV Internal
Converter

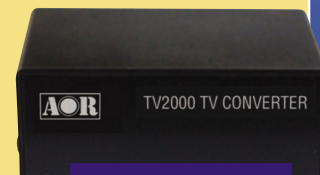


TVA-1 External
NTSC TV Converter

The **TVA-1 External NTSC TV Converter** is compact, lightweight and easy to install. Designed to be used with the AOR AR5000A series of communications receivers, its simple operation uses the 10.7 MHz IF input from your

receiver. Audio and video outputs allow monitoring a variety of sources such as broadcast TV, public safety agencies, aircraft, Amateur Radio FSTV, news media video and more.

The **TV2000 External NTSC Video Decoder** is designed to be used with the AOR SR2000. Compact and lightweight, no external power supply is required (power is supplied from the SR2000). The video output is available from the rear panel of the TV2000 and audio is provided from the SR2000 through the external speaker jack.



TV2000 External
NTSC Video Decoder



Authority on Radio
Communications

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Specifications are subject to change without notice or obligation

For more great
accessories, visit
the website at
www.aorusa.com.

Looking for USB-based VHF/UHF receivers? Your search is over.

At WiNRADiO, the innovation never stops:

This month we are pleased to introduce our WiNRADiO WR-G305e radio receiver, the first software-defined VHF/UHF scanning receiver with a USB interface.

- 9 kHz-1800 MHz frequency range
(except cellular bands where required by law)
- Optional 3500 MHz downconverter
- Tracking front-end filters
- Dual-loop AGC and AFC
- Software-defined demodulation
- Excellent sensitivity
- Fast scanning speed
- Multiple squelch modes
- Real-time spectrum analyzer
- Powerful user interface
- USB interface (serial optional)
- Plug and Play installation



The WiNRADiO WR-G305e receiver is designed for demanding applications where the ability to locate even the weakest signals in background noise and extract the cleanest possible audio is important.

The receiver construction is ground breaking and innovative. The remarkably compact, well shielded receiver connects to the computer using a universal connector which contains USB, serial and IF outputs.

In a software-defined receiver, the entire last intermediate frequency stage and an all-mode demodulator are implemented entirely in signal-processing software running on a personal computer. This brings about significant advantages: flexibility, performance, configurability, reliability and convenience. New demodulators for new types of digital modulations can be added by simply upgrading the software.

The numerous types of squelch, scanning modes and high scanning speed make this receiver a highly flexible and versatile scanner, eminently suitable for demanding VHF/UHF monitoring tasks.

Its excellent hardware parameters and extensive software support provide the G305e receiver's user with an excellent communications intercept and experimentation tool, ready for exploring classical modulation modes as well modern digital modulations.

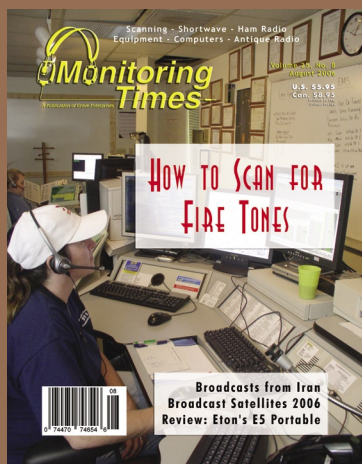
The G305e has also a number of hardware and software options to suit many applications. Check out www.winradio.com for all the latest options available, and more detailed information about this remarkable receiver.



For more information about WiNRADiO USB-based radio receivers, visit:

www.winradio.com

...the future of radio.™



Cover Story

How to Scan Two-Tone Fire Tones

By Rich Carlson

In the past, if a hobbyist wanted to silently monitor his favorite local fire agency by using the fire tones to open the scanner squelch, it wasn't an easy proposition. With the arrival of Uniden's recent series of digital scanners, the hobbyist no longer needs a second scanner, but he does still need to be able to select and program in the correct fire tones. That's what this article is all about.

In addition to helping you understand how fire tones work (and how they evolved), this article includes extensive tables to assist in determining your local tones, especially those from the ubiquitous CentraCom II Console system. Story starts on page 8.

On our cover: Dena Parker at the 911 dispatch center in Cherokee County, NC (Photo credit: Larry Van Horn)

C O N T E N T S

Voice of the Islamic Republic of Iran..... 14

By Richard D'Angelo

"IRIB" is the state organization in charge of domestic and external broadcasting from Iran. In this era of strained relations, you may want to tune in to the Voice of the Islamic Republic of Iran broadcasts in English to hear Iran's point of view. As a side benefit, VOIRI is also an excellent verifier of shortwave listener reports.

MT Satellite Review 2006..... 16

By Ken Reitz

So much has happened in the "direct-to-home" satellite broadcasting scene, it's hard to believe it began a mere 30 years ago. The constant change, however, means it's time once again to report on the services, the equipment, the upsides and the downsides to all current satellite broadcasters.

Cruising the Caribbean..... 19

By Bob Grove

For a communications junkie, what local traffic can be heard on board a typical cruise ship? Bob Grove tells readers what he found on board Carnival Cruise Lines' "Fantasy."

Reviews

Jim Clarke admits he wasn't expecting to be impressed by any new shortwave portable, but **Eton's E5** made him reevaluate. He found the E5 to be a refreshing improvement, with several design considerations that make operation easy and enjoyable. (See page 70 for the full review.)

Last month John Catalano examined the new **Icom PCR1500** to see how it differed from its predecessor.

This month, he pits the 1500 head-to-head against the PCR1000 to see how specs play out in performance (page 67).

This month in **Computers & Radio** we look at a little TLC for your computer. Catalano reviews several software solutions to removing spyware that can slow down the operation of your PC — and therefore affect your radio control and logging programs (page 72).



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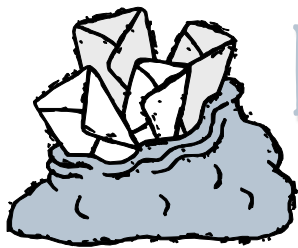
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LETTERS TO THE EDITOR

This page is open to your considered comments. Opinions expressed here are not necessarily those of Monitoring Times. Your letters may be rephrased or shortened for length and clarity. Please mail to Letters to the Editor, 7540 Hwy 64 West, Brasstown, NC 28902, or email editor@monitoringtimes.com
Happy monitoring!

- Rachel Baughn, KE4OPD, Editor

Job Well Done!

Each one of our three programming managers has left his stamp on how *MT* has covered shortwave broadcast programming. Kannon Shanmugam was the first to develop the format we used for the program listings, which ran on the same page as the frequency information. Jim Frimmel picked it up when Kannon went on to graduate studies, and we eventually separated the programs from the UTC times, to allow more freedom and flexibility in program listings.

When Jim retired from the column, John Figliozzi spent hours working on a format to get even more information into the same space, but he had to get really creative when his seven pages were later reduced to two!

Recently, John has begun to incorporate the newer programming delivery methods along with the traditional shortwave media. This allows listeners to get a better picture of what is actually happening at the various broadcasters. When you wonder where your shows have gone, you may find that some shortwave programs have not disappeared, they've just moved to a new venue.

Now, however, John is passing the torch to a new columnist, as his "day job" becomes too demanding to stay current with the ever-changing radio scene. A big "thank you" goes out to John Figliozzi – a writer who is still passionate about radio – for doing an excellent job for 9 years!

Next month we'll greet John's replacement, Fred Waterer – well known by Ontario DX Association members as editor of their *Programming Matters* column.

Radio Fun

Speaking of being passionate, it's always fun to hear from folks who have just discovered the hobby. Here we hear from a couple of them!

"Recently, I purchased a SW radio. I always wanted to know what was up in other parts of the world. No one could have prepared me for the rich content of programming that is available through short wave radio. This is amazing stuff! With the help of *Monitoring Times*, I've listened in on some really entertaining news, variety programming and social commentary.

"There is of course the BBC world service. But China Radio International, Radio Cuba. Simply too cool. I've also tuned into Netherlands Radio, The Voice of Viet Nam, Taiwan Radio International, Costa Rica, and a station out of the Middle East, I think. Egypt Radio is my guess. There is a lot of Spanish and French speaking radio. It makes me wish I'd paid more attention in French class back in school.

"Near 1001 kHz, there is an announcing 'at the tone the time...' kind of clock out of Fort Collins Co. that gives UTC time. I honestly listened to its tick-tock-chime, announcing the minutes for almost an hour. (I know, it sounds pathetic. But it helps me to learn UTC time. And that helps me in my other newly discovered activity; recreational astronomy.)

"I don't mean to gush. But the enjoyment of listening and getting a sense of the world from another perspective is very attractive. It's my intention to become an avid listener, more informed about short wave radio, and sharing my enthusiasm with others. Thanks so much. Good Listening"

- Warren Gaither, Detroit, Michigan

"The article by Carl Herbert in the May 2006 issue ("Just Do It!") was directly responsible for getting me going; I passed the Technician Class license test TODAY! (June 10) I was inspired by his encouragement and started studying for the test that was scheduled in this area less than three weeks from the time I read the article.

"As I looked into the Technician test and realized how achievable it was, I thought I would go all out for the General Class license. Today, although I flubbed the Morse Code test (a bit too soon for my skill level), I also passed the element 3 exam, qualifying me for a General Class ticket when I do pass the code test.

"So thanks AA2JZ; I will have my call sign in a few days now and I can't wait to use it."

- Dave Matthews, Brentwood, TN

P.S. June 14th Dave got his call sign off of the FCC web site. "I am now officially a licensed ham radio operator with call sign KI4PSR!"

Corrections

"I have just noticed that in the June 2006 issue on page 72 'Free ACARS decoder,' you have their download address listed as **acads.org** and it should be listed as **ACARSD.ORG.**"

- Gary Williams

"Thank you for sending the article ("Hams with a Mission," May issue). One issue: I am from The Netherlands...not Belgium :-)"

- 73e Michael Dirksen, PA5M, EX-4W6AAB (latest U.N. operation)

Ken Reitz, author of the article, responded, "I'm very sorry about assigning a different nationality to you. I don't know how I could make that mistake as your prefix is clearly for the Netherlands. I wish I could have worked you when you were 4W6AAB but I couldn't copy at all. I can't imagine where you'll end up next! I'll be looking for you on the bands

for sure. Best wishes and good luck!"

"I just wanted to let you know that I really enjoyed Ian Abel's article in the May issue of *MT*, it was nice to see so many ham related articles in one issue.

"However, something caught my eye.... there is an illustration in the top left corner of page 19 that caught my attention... just having hosted Jonathan - K2RFD at our LIMARC meeting two nights ago, I remembered the illustration from his powerpoint presentation. So, I went over to the Echolink website (www.echolink.org/) and right there in the middle of the page was the same graphic and it is listed as: 'Copyright © 2002-2006 Synergenics, LLC. EchoLink® is a registered trademark of Synergenics, LLC.'

"Other than that...great work!"

- Eddie Muro- Amateur Radio Station K2EPM

Our apologies to Echolink/Synergenics for the oversight, and thanks to Eddie for bringing it to our attention. While it is up to our writers to be responsible in providing graphics, it does not take us off the hook for confirming that the illustrations are publicly available – *rb*

Teenage Amateur

To Greg Smith ("Tales of a Teenage Amateur," May issue):

"Really enjoyed the CW project you built in *Monitoring Times*. I have been intrigued by these little chunks of wood for years. I have had a copy of *Electronics Illustrated* from March 1968 with a similar transmitter that I always planned on building but never did.

"I live in a townhouse in NJ now and that is out of the question. Did you get it on the air yet?"

- Mike, K1MH

Hello Greg,

"Thanks for the article. It brought back memories from the late '50s when got a Heathkit crystal radio as a gift. My next project was a Heathkit 2 tube regenerative broadcast band receiver. I suspect I had more money than you, but was much less creative and handy with tools. I also was given two ARRL handbooks from the '40s but was never able to construct anything so complex from scratch."

- Robert VE2AGE, Gatineau, Quebec, Canada

Flex is Great!

"This is just a note to let you know how well the 'flex antenna' you described (in the March issue) worked for me.

"I spent 20 minutes a few days ago assembling the flex antenna. Admittedly, I

was expecting only mediocre results. Guess what? This simple antenna works GREAT! I dependably monitor broadcast stations, utilities, and various other interesting services. This antenna even performs flawlessly on the ground!

"Anyway, thank you for doing all the leg-work and experimenting to make this antenna so practical. Thanks also for continuing to publish such an outstanding magazine. I have been reading it since it was in the 'newspaper' format."

— John Strand W6IBL

Wrong Conclusion Drawn

"Regarding the article in *Communications* ('Cellphones' Danger to Aviation no Myth,' June 2006), either you obtained the information third hand from questionable sources or in fact, you totally misrepresented both cases. I did watch the *Mythbusters* program, and as a member of IEEE, received the *Spectrum* magazine and read the article several times.

"On the *Mythbusters* program, they went to the junkyard and surplus sites and obtained a panel and some used instruments. They wired (unshielded) them up and then tested, using signal generators and spectrum analyzers.

"In that lash up, they did in fact create interference. However, at the end, they took the same gear and put it on a commercial plane, and despite their best efforts and power levels far greater than normal cell phones, they were not able to create the slightest blip, that is, no interference at all on the commercial plane. They showed behind the panel and how the wiring is all shielded and bypassed, no doubt protecting the instrumentation.

"The *Spectrum* article was authored by three PhD's spending public grant money. What they did is put a portable spectrum analyzer with a data recorder in an overhead bin. Their findings were if a cell phone was left on or turned on and used, the spectrum analyzer picked the signal up, only if it was close enough. They admitted they couldn't detect signals the entire length of the plane. Their conclusion was if they could pick it up, it could interfere! Six years of school for that? They then provided two anecdotal stories one nearly 20 years old that had no technical substance. The *Spectrum* article was technically bankrupt and a disgrace to us electrical engineers. I sent a letter to the *Spectrum* editor also.

"Despite all that, I am opposed to the use of cell phones on the plane at any time. And, as a radio amateur, with all the trash that computers put out, I would ban the use of those also. I happen to fly Delta once or twice a month and they have taken it to ridiculous levels. Now, when passing down through 10,000 feet, the announcement to turn off all electrical devices has an added twist. The flight attendant says 'turn off all electronic devices, including noise canceling earphones, as they may interfere with the navigation system of the plane.' Holy crap, is that STUPID!

"OK. I'm climbing down off my soapbox. Thanks for taking the time to read this."

— Fred E. Piering WD9HNU

Thanks for writing, Fred. I guess I was impressed that the cell phone had any affect at all on the instrumentation, and although *Mythbusters* got no blips at all in the modern, shielded cockpit, I wasn't sure I'd want to gamble on every plane having effective shielding.

I did not read the whole *Spectrum* article — just a couple of stories which referred to the study; your description of it does make it sound pretty unscientific. In the end, it looks like banning scanners, radios and other "electronic devices" such as noise canceling earphones is just as suspect as we all thought it was! They're not in the same class with cell phone signals.

I agree with your statement in a later email, "I think what we really need is a comprehensive EMI/RFI testing of aircraft to determine what and how much would affect a plane's electrical system. Of course, this probably varies with plane model. It may also be that the problem could only be discovered when the aircraft is off the ground and in the air, adding an additional degree of excitement to the test!"

— Rachel Baughn, Editor

Air Antics

"I just had to share this one with you all. I was monitoring the ARINC company freqs and caught a transmission from I believe a COMAIR flight on 131.150 MHz to his dispatcher: 'We are airborne and just discovered a customer is onboard with their dog wrapped up in a blanket. Not in a kennel. What do you want us to do now?'

"Don't know how that one came out, but Toto is in deep trouble. ;-)) Call the feds.

"Hope to have some ARINC and other civilian air freqs on my personal blog (<http://monitor-post.blogspot.com>) soon."

— Larry Van Horn N5FPW

Also see this month's *MT Help Desk*

for more information on the airline company frequencies where Larry heard the above conversation, as well as a medical emergency. As always, there's a lot of good stuff in this information-packed issue, so get out your highlighter and enjoy!

SBS-1 Virtual Radar in Action

"Attached is a picture of me and your SBS-1 winner, Evelyn Waters of the Air History Museum near Mount Holly, NJ. The picture was taken 17th June at their fund raising day. They also used the event to unveil their SBS-1 exhibit.

"ENIcommunications was on hand to give demonstrations to passers by as well as check out that they had it all set up correctly (which they didn't!). I also upgraded their receiver to the new V3 firmware making the SBS-1 receiver some 20dB more sensitive! With the addition of the external antenna and pre-amp donated by ENIcommunications they now have a setup that was the envy of the Air Traffic Controllers at the tower (the museum is located on the South Jersey Regional (KVAY) airfield).

"In addition to the SBS-1 display they had the usual round of fighter aircraft, etc. on display as well as demonstrations of vehicles and equipment owned by enthusiasts whom were camped in period military tents on the airfield grounds. The staff are all ex-military and wore their uniforms or combat fatigues. Quite a few pairs of Tiger Stripes were seen wandering around as well as some pretty high ranking Navy uniforms on the old guys.

"The commander of the local Civil Air Patrol stopped by and nearly wet himself when he saw our display. He's of the opinion that they could use this as a Search and Rescue tool.

"A good day was had by all!"

— Mark Phillips, G7LTT/KC2ENI, ENIcommunications Corp.





COMMUNICATIONS

AMATEUR RADIO

Fatal Amateur Accidents

Two seasoned transmitter hunters from California died May 29 after the vehicle in which they were riding during a mobile hidden transmitter hunt went over a cliff in rugged terrain near Lake Isabella in Kern County, California. They were identified as Michael G. Obermeier, K6SNE, of Anaheim, and David A. Gordon-Ross, of Yucaipa.

ARRL Amateur Radio Direction Finding (ARDF) Coordinator Joe Moell, K0OV, knew both men. He notes that Obermeier had suffered a sports-related spinal cord injury that left him a paraplegic. "He did all the adaptive work on his vehicles, of which he had quite a few that he used over time for RDF," Moell said. Despite his physical limitations, Obermeier also enjoyed foxhunting from his wheel chair.

Ron James Spears of Klamath Falls, Oregon, died in an accident on May 14, while attempting to dismantle a 40 meter radio antenna mounted on the top of a 160-foot ham radio tower. His plan was to climb the tower and dismantle the antenna piece by piece, but when Spears was about 10 feet below the top of the tower, the tower snapped and fell.

Even the professionals make mistakes – In early June, three tower workers died when they fell from a 1,100-foot television broadcast tower north of Oakland, Iowa. Tower work is always risky business.

Volunteers Needed for Bird Research

Joe Moell K0OV tells *MT* that radio listeners are needed to assist in a wildlife radio-tagging project to help track the movements of endangered birds. The Department of Biology at York University in Toronto is collaborating with the University of Guelph and Wildlife Preservation Canada to study the dispersal and migration patterns of captive-reared, juvenile Eastern Loggerhead Shrikes.

On August 1, 2006, twenty radio-tagged captive-reared juveniles will be released from a site in Ontario that is approximately 100 miles north of Buffalo, New York. It is hoped that some birds may be tracked all the way to their wintering grounds in southeastern states of the USA.

The tiny transmitters will be on six frequencies between 172 and 173 MHz. Each will send a very short pulse every second or so, to maximize battery life. Researchers expect the batteries to last about three months.

For up-to-date information on this project, including frequencies when available, go to www.homingin.com. This site also has pages describing the special characteristics of biological radio tags as well as information on the best equipment for monitoring and field tracking.

FCC Scolds Manassas BPL

In two strongly worded letters, the FCC's Enforcement Bureau has directed the Manassas, Virginia, broadband over power lines (BPL) system to take appropriate steps to eliminate harmful interference to Amateur Radio operators. The FCC minced no words in detailing what it wants the city and BPL operator COMTek to do to ensure its system complies with Part 15 rules governing BPL systems and even hinted that it may shut down all or part of the system.

ARRL CEO David Sumner, K1ZZ, said the League is "especially gratified" that the Enforcement Bureau's Spectrum Enforcement Division has ordered the City of Manassas to take steps to prepare for a cessation of BPL services.

"Clearly, the FCC has lost patience with COMTek's reliance on misleading news releases as a substitute for meaningful solutions to the ongoing interference," he said.

Mass Ham Satellite Launch

Thirteen Amateur Radio Satellites are being launched on the 28th June 2006 on a DNEPR-ILV rocket from the Kazakstan Baikonur Cosmodrome in what will be the largest ever deployment of Amateur Radio Satellites.

Twelve of the satellites have downlinks in the Amateur Radio Satellite Service allocation between 435 and 438 MHz and one will operate on 145.950 MHz so they'll be lots of signals to listen out for after launch. Further information on the Dnepr Launch 1 can be seen at: <http://liltonlab.atl.calpoly.edu/>

One of the CubeSats to be launched is known as SEEDS. Built by students at the Nihon-University it contains a CW beacon, Digi-Talker and other experiments. After launch it will operate a CW beacon on 437.485 MHz using the callsign JQ1YGU. The Digi-Talker experiment will be activated later.

If you fancy building your own CubeSat check out www.cubesatkit.com/

Moon Pie Launch

The University of Tennessee Amateur Radio Club (UTARC) is launching a pile of moon pies in a helium balloon from the Knoxville Hamfest June 10 just for the heck of it (www.utarc.org/wiki/index.php/Pie_in_the_Sky). It is expected the pies will freeze on the way up to 30,000 ft. When the helium balloon bursts, the moon pies should make a soft landing not too far away using a cheap parachute.

The pies will be tracked using an APRS PocketTracker on 144.390 MHz and 10.105 MHz and also live at aprsworld.net – although, of course, this experiment will be eaten long before you read about it! We just thought you'd like to know amateur radio isn't always serious.

BROADCASTING

Record-Breaking Broadcast

John Victery called our attention to the April 23, 2006, broadcast of the 4000th weekly program of *Music and the Spoken Word*, now in its 77th year on the air every Sunday, without interruption, since July 15, 1929. Says John, "As you undoubtedly know, it all began with Salt Lake City's KSL radio and to this day continues via their facilities. On that very first broadcast, 30 stations around the United States were hooked in to receive the broadcast ... On the four thousandth broadcast, among other dignitaries was President George W. Bush, who extolled the great achievement of the Church of Jesus Christ of Latter Day Saints and the many members of the Mormon Tabernacle Choir across more than three quarters of a century."

DRM 26 MHz Service

VT Communications partnered with Deutsche Welle and UBC Classic Gold to launch a dual-channel Digital Radio Mondiale (DRM) transmission service into Greater London. The broadcast includes two discrete broadcast services over a single 20 kHz transmission band centered at 25.7 MHz.

The 26 MHz band is designated as an international broadcast band, but is of interest because it is under-used and could potentially be used to provide local "FM" type coverage. Demand for both FM (88-108 MHz) and DAB (band III) spectrum in the UK is very high, and DRM could offer broadcasters access to additional spectrum in addition to enhancing audio quality on existing MF and LF frequencies.

VT Communications also added a new high power MF transmitter in 2003, which now transmits the BBC World Service in digital quality to the Benelux countries. In March 2006, VT Communications announced a significant investment in a new high power HF transmitter at its Woofferton (Shropshire, UK) transmitter site.

VT Communications is also investing in a new broadcast centre designed to distribute audio in a totally digital format from studio to listener, including distribution of DRM. This will eliminate audio degradation caused by repeated conversion between analog and digital, a surprisingly common problem with digital transmissions.

DRM Possibilities?

Don Messer, Chairman of the DRM Consortium Technical Committee, spoke to the National Association of Shortwave Broadcasters about the introduction of DRM in the Americas. He firmly believes that within 2 years, DRM broadcasts will be available either commercially or as public broadcasting or both with people using affordable receivers.

The shortwave broadcasting band at around 26 MHz (see story above) contains a potential

43 non-overlapping 10 kHz channels, providing plenty of spectrum for high quality radio. Messer indicated that National Public Radio (NPR) expressed strong interest in DRM and has informally committed to doing 26 MHz tests in major metropolitan areas.

Richard D'Angelo was "drafted" to be Chairman of a DXers/Listeners Liaison Committee with DRM USA.

American Forces Radio signs off

Icelandic National Broadcasting Service, RUV, reports that the US Armed Forces Radio at the Keflavik military base signed off June 1st after broadcasting continuously for 55 years. Earlier this year, the US decided unilaterally to withdraw the bulk of its forces from the military base at Keflavik.

Shortwave in Latvia

Since 2002 various radio services have been relayed via the shortwave facilities of the LRTVC at Ulbroka. However, the company which arranged the relays no longer holds a shortwave broadcasting license in Latvia. Currently, RNI is the only officially sanctioned shortwave broadcast radio station in Latvia. The website address is: www.rni.fm

New VOA Studio Tour

A new VOA Public Tour, lasting about 45 minutes, has recently been announced. Tours are Monday through Friday at 12 noon and 3 p.m. Reservations are recommended and can be made online at www.voatour.com or by phone at (202) 203-4960. Address: 330 Independence Ave. SW, Washington DC 20237.

FCC

Media Ownership Rules

Media watchdog groups proved to be right when they predicted one of the first actions to be undertaken by the full Federal Communications Commission would be to propose new media ownership rules. Until the new commissioner gave Republicans a 3-2 majority, the Commission has been deadlocked 2-2 along party lines. FCC Chairman Kevin Martin is already on record as being committed to overturning the ban on same-market cross ownership. The "cross ownership" rule was enacted in 1975 to ensure media diversity.

SBCA Takes on OTARD Challenges

"Even 10 years after the Federal Communications Commission first published the OTARD (over-the-air reception devices) rule, homeowner associations, cities, counties and other governing bodies are still creating rules that are in direct conflict with federal regulations," said Noah Cutler, state regulatory affairs liaison with the Satellite Broadcasting and Communications Association (SBCA). The SBCA web page acts as a clearinghouse for problems faced by satellite installers and viewers and help SBCA better protect their

right to install satellite dishes and antennas. The on-line form can be accessed at: <http://www.sbca.com/otard/default.htm>. More on OTARD can be found at the FCC at: <http://www.fcc.gov/mb/facts/otard.html>.

Satellite Radio Hijackings

Motorists listening to their radios have complained of their audio being temporarily "hijacked" by stronger signals from satellite radios in passing cars. Although Howard Stern's raunchy broadcasts were specifically mentioned in news reports, the rebroadcasts are a problem with both Sirius and XM radio services.

Part of the problem arises from after-market satellite radios. If not properly installed, the satellite radio signal can be transmitted over a car's existing FM antenna. But apparently other problems also existed: XM Satellite Radio Holdings Inc. has suspended shipments of Delph Corp.'s XM SKYFi2 and Audiovox Corp.'s Xpress which were found to exceed FCC transmission emission limits.

Seeking Comments

The FCC is seeking comment on the recommendations presented by the Independent Panel in its final report on Hurricane Katrina. The recommendations are organized into four areas: (1) pre-positioning the communications industry and the government prior to disasters; (2) improving recovery coordination; (3) improving the operability and interoperability of public safety and 911 communications; and (4) improving communication of emergency information to the public.

The FCC seeks to determine what actions the Commission should take, and whether they should rely on voluntary cooperation with recommendation or on other measures to enhance readiness and response efforts.

The FCC is also still in the middle of an on-going evaluation of the national Emergency Alert System.

The Satellite Report

The ORBIT Act, as originally passed in 2000 mandated the privatization of INTELSAT and Inmarsat, and established a procedure for tracking the process to ensure it was done in a way that would encourage competition. In their recent report to Congress, the FCC concludes that both Inmarsat's and INTELSAT's privatization appears to have had a positive impact on the global marketplace for communications services by ensuring increased competition and increased access. Inmarsat and INTELSAT are committed to provide service to all portions of the globe, and Inmarsat continues to support global maritime distress and safety services ("GMDSS").

Air-Ground Spectrum Auction Concludes

The Federal Communications Commission's (FCC) auction of two nationwide Air-Ground spectrum licenses in the 800 MHz band ended on June 2, 2006, raising total net bids of \$38.3 million. The winning bidders for the two licenses were AC BidCo LLC and LiveTV, LLC.

The spectrum that was auctioned is currently

used by Verizon Airfone to provide seat-back telephone service. Airfone may continue to operate in the remaining one MHz of the band until its license expires in 2010.

The four MHz of Air-Ground spectrum in the 800 MHz band can be used to provide a range of communications services to passengers on commercial and other aircraft, including broadband Internet access. The auction, however, does not affect the Federal Aviation Administration's (FAA's) restrictions on use of personal electronic devices and the use of wireless telephones on airplanes.

MISCELLANEOUS

Aging Antennas

Although the Deep Space Network has been able to meet most of its responsibilities so far, a GAO report said the infrastructure "is aging and is likely to become increasingly fragile and subject to breakdown at a time when demand is anticipated to increase. The potential exists for the loss of scientific data that would be difficult, if not impossible, to replace."

A review of NASA's Deep Space Network by the General Accounting Office found that portions of the 40-year-old system are shut down 16 hours a week for repairs and maintenance, on average, and officials are worried about metal fatigue causing a collapse similar to the 1988 collapse of the 300-foot Green Bank radio telescope in West Virginia.

Each year, the Deep Space Network communicates with 35 to 40 distant spacecraft through 16 giant, dish-shaped radio antennae. The antennae are located in Goldstone, NM, Madrid, Spain, and Canberra, Australia, to provide coverage of the entire sky.

GOES-N Launched

The next-generation GOES-N weather satellite was finally launched from Cape Canaveral May 24th. This first of three Boeing-built Geostationary Operational Environmental Satellites (GOES-N) for NASA and the National Oceanic and Atmospheric Administration (NOAA) was originally intended for launch in 2001.

The multi-mission GOES series of satellites will provide NOAA and NASA scientists with data to support weather, solar and space operations, and will enable future science improvements with weather prediction and remote sensing. GOES-N also will provide data on global climate changes.

"Communications" is compiled by editor Rachel Baughn KE4OPD from news submitted by our readers. Many thanks for this month's fine reporters: Anonymous, Enrique Acevedo, Azizul Al-Amin, Norman Hill, Peter Martinez, Joe Moell, Jerry None, Ken Reitz, Doug Robertson, David Smith, Greg Smith, Phil Stripling, Larry Van Horn, J Victory, and Ed Yeary.

How to Scan for Two-Tone Fire Tones

By Rich Carlson, N9JIG

The ability to silently monitor a fire or Emergency Management Service (EMS) channel until a call is dispatched for your favorite agency has been on the wish list of many radio hobbyists. While one could always go out and buy a dedicated pager or two-way radio with these capabilities, one would need the ability to program or equip the radio with the proper tone needs. The expense of dedicating a radio for such a singular purpose is too much for most hobbyists to consider.

Enter the Uniden BCD396T

With the arrival of the Uniden BCD396T,

the BR330, the BCD996T, and anticipated future scanners with this capability, such as the BCT15, one can have the same capabilities as a dedicated paging receiver while also having a full featured scanner. Let's look at some of the ways the BCD396T ("BC396") works with fire tones.

First, there are several firmware versions. This document deals with the BC396 firmware 1.08.07 version that was current in September 2005. Previous versions had different capabilities and issues that have been addressed in this version. It is possible that new capabilities or procedures could appear with newer versions

or radios.

When you program a set of fire tones for your local agencies, you need to know a couple things. Obviously you need to know the radio frequency. Since we have been dealing with scanners for decades this is not usually a problem. Most fire operations in my area are on VHF high band; some areas concentrate on low band, and others may use UHF or even 800 MHz. The BC396 fire tone out feature does not work in the trunked mode; in fact, when using the Fire Tone Out mode, the radio is unable to perform any other functions.

Once you know the frequency, you need to find out what tones are being used. To find these, follow the procedures found later in this document. The BC396 works only with "1+1" signaling; that is, it works only with a single tone followed by a single tone. It does not work with DTMF (TouchTone), 5-6 or other formats. Fortunately, the vast majority of fire departments that use tone signaling use 1+1.

2+2 Tones

What about 2+2, you ask? The original QuickCall (now referred to as QuickCall-I or QC I) system was 2+2. This is the type of signaling used by the LA County Fire Department until 1997 and made famous by the old "Emergency" TV show. The familiar tones would go out and Johnny and Roy would run to the rescue squad and save the day.

The Station 51 tones heard on the show usually consisted of three tones. The first two were the tones sent over the radio; the third was actually the station alert, not sent over the radio.

2+2 works by sending two simultaneous tones out for about 1 second, followed by another set of two simultaneous tones for another second. This is very similar to the way DTMF works. Some users of the BC396 have reported success in decoding some 2+2 tone sets with



photo credit Larry Van Horn

the latest firmware revisions. This is done by programming in one of the first set of tones and one of the second set of tones. While it may also work for you, this method is not supported by Uniden, and, as they say, "your mileage may vary."

1+1 Tones

Going back to 1+1, there still are several manufacturers that make 1+1 encoders and receivers. Plectron (out of business for years now), made receivers that were ubiquitous around firehouses and in firefighters' homes around the nation. Plectron became more than a brand name – like "Coke" or "Kleenex" it came to signify any type of alerting receiver.

Other early players in this field were Motorola, General Electric, Federal Signal, Reach, and even Bell and Howell. These days the market is dominated by Motorola. Several smaller manufacturers make alerting receivers and several companies make encoders, but Motorola's Minitor line of receivers rules the roost.

Tone sets in 1+1 are referred to as the "A" Tone and "B" Tone: The A tone is first, followed by the B tone. Some systems use a long single tone for group calling. This can be referred to as either "Long B" (when using the B tone of a group of pagers) or "Long C" (when using a separate tone). Long B systems allow the use of two reeds or filters for both individual calls and group calls. Long C requires three.

Tone Groups

The legacy of the several vendors gave rise to several groups of tone sets. Most agencies or localities tended to use a single group of tones for good reason. The early tone generators and receivers used mechanical reed filters or tuned coils to generate or decode tones. By limiting

the number of tones used, agencies did not have to invest in larger amounts of expensive equipment.

Early encoders used somewhat standardized tone groups, depending on the manufacturer, and thus different combinations of the various tones were mixed and matched to allow for multiple tone sets from a set of reeds. Most tone sets were in groups of about 12, which allowed over 120 individual combinations of 1+1 tones, usually enough for local operations. 2+2 used the same type of reeds, but allowed a much greater combination of tone sets.

By being familiar with the various tone groups, one can more easily decipher the actual tones used by an agency. Since most agencies tend to use tones from within a single group, it can help pinpoint the actual tone used instead of mistaking it for a nearby tone from another group.

With modern consoles and encoders, tones are no longer restricted to a single group, and more and more agencies are starting to select tones from differing groups. This tends to blur the tone deciphering process. Fortunately, the BC396 is pretty forgiving when it comes to tone selection, usually working as long as you have it programmed within a few Hz either way.

Gathering tone information

The big question is, how do I figure out the tones used by my agency?

The best way to get the tones is from the users. Some agencies will be happy to let you know what tones they use, officially or otherwise. You may find another hobbyist who has figured out the tones used already or you may need to analyze the tones off the air.

For off-the-air deciphering, you could use one of several software applications. Adobe's Audition, the shareware Win-Tone, Frequency Counter, and others allow a soundcard-equipped computer to be used to decipher two-tone tones as well as other sounds.

If you have access to the Communications Center or have the help of a friendly dispatcher, you may be able to get the tones from the console. Different console manufacturers use different protocols to determine the tones sent. They may read "Cap Codes" (3 or 4 digit numbers representing the tone sets) or sometimes the actual tone frequencies. Often dispatchers will only have the agency's name for the tone on the button ("Station 1", "Callback"...))

CentraCom II Tone Encoder

The most popular radio console used in Public Safety Dispatching for the last 15 years has been the Motorola CentraCom II. The CentraCom II has a built-in paging encoder for the most popular tones used in two-tone paging. The CentraCom II console uses a 4-digit code to determine the tones sent. This tone consists of three parts. The first two digits tell you the two groups from which the A and B tones are drawn. The third digit identifies the A tone from the group previously determined, and the fourth digit identifies the B tone.

First break down the 4-digit code into XXYZ (XX is the first two digits, Y is the third digit and Z is the fourth).



photo credit Harry Baughn

Take the first two digits of the 4-digit code (XX), then look these digits up in Table 1. Table 1 will give you the two groups from which to choose the tones. The "A" Tone will be from the first group listed, the "B" tone from the second.

After finding the two groups, refer to Table 2, take the third digit of the 4-digit code (Y) and select the corresponding Tone Frequency from the first listed group. Take the fourth digit of the 4 digit code (Z) and select that corresponding tone from the second group.

Let's say that the CentraCom shows a code of 0419. According to Table 1, the "04" refers to Groups 4 and 10. The 1 and 9 refer to tones 1 and 9 from those groups. Tone 1 of Group 4 is 339.6 and Tone 9 of Group 10 is 1881.0. Thus, if your CentraCom shows a 4-digit code of 0419, you would program the tones of 339.6 and 1881.0 into your 396T for this code.

For a second example, let's take the CentraCom code of 07BD. The 07 tells us that the tones are from groups 10 and 5. The B in 07BD tells us that the "A" tone is 1082.0 as indicated by Table 2. The D in 07BD tells us that the "B" tone is 701.0. Thus, the two tones you will program into your scanner are 1082.0 and 701.0.

In Table 3 you will see each of the various tones used in the many manufacturers' radios and the codes used to identify them. For some reason, Motorola and other manufacturers like to assign code designators to these codes, much like the codes used to identify PL tones. The tone designators reflect the company that originally used them.

Tone Designators

Each major manufacturer of tone equipment selected the tones they stocked reeds or coils for. Each of these tones were usually then assigned some sort of designator. Since Motorola became the largest seller of this equipment, they started assigning their own designators to



photo credit Harry Baughn

some of the tones and the Motorola list became a sort of de-facto standard.

QuickCall I tones were assigned in three groups of 12 tones each. Each tone within the group was assigned a letter: C, D, E, F, G, H, J, K, L, M, N and P. The groups themselves were designated A, B, and Z. Eventually the individual tones came to be identified by a two-letter designator: the first letter would be the C-P code and the second letter is the group assignment, for example, CA, GB or PZ. CA would indicate tone C of group A.

2+2 tone sets for QC-I were identified with a 4-letter code. The first two letters identified the first set of two tones and the second two letters identified the second set of two tones. HKPJ would indicate that tones H and K were sent first and tones P and J were sent second. This also depends on all the tones being from within the same group.

When Motorola developed the QuickCall II system, they used 3-digit identifiers for each of the 80 different tones. These numbers started at 108 and went thru 209, skipping 132-137, 163-169 and 180-188. Why these designators were skipped or chosen is a mystery, but I am sure that Motorola had a logical reason for it.

Plectron had a less rigid set of tones; they would allow you to choose any tone you wished. They did have a set of tones that were most often used, but they did not use groups like Motorola. Common practice has assigned designators to Plectron tones from P1 through P56.

Reach, GE, and others used several variations of these formats. GE tones are designated as G1 through G51 in popular nomenclature; Reach is R11 through R55, Federal is F1 through F20, and so forth.

Tone Groups

Why are tones arranged into groups at all? It all goes back to the old method of generating tones. Originally, mechanical reeds were used to generate the tones. The reeds were cut to vibrate at very specific rates and then transmitted over the air. On the receiver, reeds would then be set to vibrate: If it vibrated at the correct rate, a contact would close, opening up the receiver. Some receivers – Plectrons, for example – used tuned coils to accomplish the same end. Others used tuned filters.

Since reeds were expensive and clumsy to operate, most agencies only had a single set of them, so all the different pagers used tones from that group of reeds. Even though electronic tone generators can now be programmed to generate any tone one can desire, tones are often still drawn from a single group.

The original Motorola QuickCall (now called QuickCall I or QC-1) used 12 reeds in three groups, A, B and Z. QC-1 originally was

configured as “2+2,” in that the system generated and sent two tones simultaneously. The dispatcher would choose two buttons for the first set of tones (A & B) and then two for the second set (C&D). There were three groups of 12 tones, A, B, and Z. Many users of the 2+2 pagers have since converted to 1+1, thus QC-1 codes are included in most 1+1 encoders.

Quick-Call II (QC-2) came about later, always in 1+1. This was simpler and cheaper to use, in that one only needed two reeds instead of four. It also was similar in function to the protocols used by competitors such as Plectron, G.E., Reach, Federal, and Bell & Howell. It, too, originally used groups of tones, and pagers used 3-digit “Cap Codes” to identify the tones used. The first digit identified the group, and the second and third identified the “Buttons” or tone numbers. This system worked within a specific “Plan,” so Cap Codes were reused across Plans. For example, Cap Code 336 in Plan G would have tones of 304.7 and 979.9; the same Cap Code in Plan D would have tones of 389.0 and 788.5.

Some pagers use tones not from any group, but basically selected at random. Often these are tones that are divisible by 50 or 25 Hz. Winnetka, for example, uses 1200 and 1400 Hz. 1200 is not a member of any standard group, while 1400 is part of a Bell & Howell group. These tones were generated by a Plectron encoder for Plectron receivers. Since Plectron receivers used tuned coils in place of reeds, any tone arrangement could be used.

Timing

Sometimes it is difficult to tell the exact tone used when two or more tones are fairly close. For example, 457.1 is Motorola’s code EB while 457.9 is GE’s G44. Most decoders cannot tell the difference. To determine the actual tone used, one can measure the length of time each tone is sent, and sometimes this will help determine the manufacturer and thus the actual tone code. Since the different manufacturers used different timings, this often can help determine the tone sets.

With modern encoders and decoders the timing is not as critical, so this method is not fool proof.

In addition, the various manufacturers had different alert tones or warbles: QC2, for example, uses 0.1 sec of 900 Hz followed by 0.1 sec of 1500 Hz, with this combination repeated for 2 seconds.

Older versions of the 396 firmware required users to enter timing details as part of the fire tone out programming. This has been done away with in later versions; if your radio still shows Timing or Gap settings, update to the later versions of firmware by going to the Uniden website at http://www.uniden.com/rn_productsupport_downloads.cfm?product=BCD396T

[uniden.com/rn_productsupport_downloads.cfm?product=BCD396T](http://www.uniden.com/rn_productsupport_downloads.cfm?product=BCD396T)

Why fractional tones?

You have probably noticed that most tones used are not integer numbers, in that they are like xxx.3 or xxxx.7. The reason for this is to prevent harmonics. When differing frequencies with certain mathematical relationships interact, false signaling can occur. For example, a receiver set to open up when receiving a tone of 700 Hz might also open up with a tone of 350 Hz, one half of the desired tone. Decimal numbers are used to avoid these harmonics, to confuse lay people like us, and keep mathematicians employed!

If you analyze the various tone groups, you will find that there should be no harmonic mathematical relationship between any of the frequencies.

Off-the-air Deciphering

If you are unable to get the actual tones used from other sources, you may need to record the actual tones used from a scanner and analyze them. This is easier than it sounds. First you need to archive the tones so that you can play it through an analyzing program. I use Scanner Recorder (<http://www.davee.com/scanrec/>), a free program that allows you to save recorded audio to a .wav file. It automatically starts and stops on squelch and allows the user to visually examine the audio. It has a built-in timer that shows the current time, elapsed time, and recorded time.

Connect a patch cable from the record out or external speaker jack of the scanner to the line in or mic jack of your computer’s sound card. Make a few test recordings to get the levels set right. You want tones to show just about full scale on the visual wave form display. Voice traffic will then range from top to bottom. Open keys will show up as well.

Some scanners have a Record Jack. Radio Shack scanners, such as the Pro2006, work well for recording from the record jack, as the volume at the record jack is not altered by the volume control. If you are using a BC780/785/796, the record jack works differently. These radios’ record jacks are set to pass audio only when the channel received is programmed to allow it. While this is an interesting feature, it tends to insert a delay before audio is present at the record jack, often skipping portions of the tones.

When recording from these Uniden scanners or scanners with no record jack, I have had good success running a straight patch cord from the external speaker jack to the Line In or Mic jack of the computer’s sound card. I then use the Windows volume control to adjust the volume of the audio coming from the computer speakers, so I can still hear the scanner or mute it at night or when I want to record the audio without listening to it.

In Windows, right click on the Volume Control icon in the System Tray at the lower right corner of the screen. Select “Open Volume Control” and then, under Options, select “Properties,” Select the “Recording” button, and click

Timing Comparison Table

All times in seconds:	QC2 Fast	QC1 Slow	Plectron	Plectron Fast	GE Slow	Reach	Reach
Pre-tone delay	0.90	0.80					
Tone A Duration	1.00	1.20	0.75	3.00	1.00	0.15	2.00
Intertone gap	0.00	0.00	0.00	0.00	0.00	0.02	0.02
Tone B Duration	3.00	1.20	0.25	0.25	1.50	0.15	0.70
Long single tone	8.00	8.00	3.00	3.00		5.0	5.00

"OK." Make sure that the input to which you connected the scanner is selected (usually the Microphone or Line In jack). If you tune your scanner to a local weather station, you should be able to hear the scanner through the computer speakers. Use this to adjust the level with the slider control. This will help control the audio recorded by your recording application.

Select Options again from the Master Volume Control and you can adjust the volume of the audio heard through the computer speakers. This adjustment will not affect the level of audio recorded, just what you will hear from the speaker.

You may need to adjust the volume of the scanner as well as the levels on the computer. Make a few practice recordings to find the right balance. When you have a good balance of levels, you should have close to full deviation on the visual indicator in Scanner Recorder. If your levels are too high, then the visual wave form will just be a solid block. This becomes important later!

There are other programs that work in a similar fashion; check the Internet for various shareware programs.

Audition your Tones

Once you have a tone out recorded into a .wav file, you can then run it through a program such as Adobe Audition (currently at version 2.0) or some other audio analyzer. Audition will allow one to analyze the audio clips and show a visual display of the wave form.

Once you have "seen" a couple tone sets, you will see what the tones "look" like on the visual wave form display. Most of the time they will be several seconds of full deviation indicated by solid color, preceded and followed by dead key of a few hundred milliseconds. You can also cut segments out of the larger file and save clips. If you save a clip of a set of fire tones, be sure to save enough of the voice message to identify the use ("Booop, beep, Mayberry Fire, a rescue call at Floyd's Barber Shop, 242 Main St...").

Audition allows a spectral analysis that displays the tone frequency. You can place the cursor directly on a portion of the tone to display the decoded frequency. My experience has shown that tones decoded by Audition and other programs are usually off by 1 to 10 Hz, with the amount of error increasing with the tone frequency. This is usually close enough for a 396, which has a slightly larger range of fudge factor.

By saving clips of fire tone sets, you can run them through the audio analyzer as often as needed to determine the tone frequency. These programs often also allow you to generate tone sets yourself, so that you can compare them with the real thing.

Audition is pricey – \$130 for educational users, \$300 for others – but you can download a 30 day free trial from the Adobe web site (www.adobe.com/products/audition/). If you only need to figure out your local tones, this will work nicely. Audition also allows one to generate tone sets, so that you can find sound-alikes with which to compare. It is an extremely powerful tool and can be used for many other

tasks. Some users have been able to figure out 2+2 and touch tones with Audition as well by using filters within the application.

The following lists of tones indicate several things that may help you determine the actual tones in use. The Groups indicated are as Motorola denotes them. The "Button" indicates the tone number from within the chosen group. Since Motorola consoles usually have a 16 button encoder, this allows 16 groups of 16 tones each. This means there are a theoretical 65,536 possible tone sets that can be generated.

In practice, however, this number is somewhat less. Not all groups have 16 tones assigned to them, and some tones cannot be used with each other due to harmonics or audio aesthetics. It is hard on the ears to listen to a tone set of, say, 304.7 Hz and 2880 Hz. With most receivers being programmed with tones from the same group or at least the same series (QC1, QC2, Plectron, Reach, etc.), the actual tone set numbers are seriously reduced.

Table 1 allows you to figure out what tone groups a CentraCom II Console code number refers to. Take the first two digits of the code and look it up on the list. Once you find the two groups, you can look up the actual tones from Table 2.

Table 2 shows the tones from each group as so designated on the CentraCom II. Take the third digit of the Motorola 4-digit code and select that numbered tone from the list of tones in the correct group: this will be your "A" tone. Do the same with the fourth digit: this will give you your "B" tone. If it turns out that both tones are the same, then it is a "Long B" or "Long C." This will be sent out for 6 to 8 seconds.

Additional 396 Fire Tone Out Features

The 396 has another neat feature in the Tone Out mode. If you set the 396 "A" tone to 0 and the B tone to the correct tone, it will decode on a "Long B" or "Long C" when it detects a steady tone of over 4 seconds.

If you set the "A" Tone on the 396 to a specific tone and the "B" tone to 0, then the

396 will open up on a shorter detected tone of the correct value. Since many agencies will use tone sets that have a common tone among all the sets, this would allow you to merely program that common tone so that the radio opens on all of the combinations.

Let's say that Mayberry FD has five stations. Each station has an "A" tone of 701.0 Hz. Station 1 has a "B" tone of 1082.0, Station 2 has a "B" tone of 834.0, Station 3 has a "B" tone of 589.7 Hz, and so on. With the 396 set with an "A" tone of 701.0 and a "B" tone of 0, it will open when the tones for any of the five stations are sent.

If our Mayberry FD has a Long C tone of 992.0 Hz that opens receivers in all the stations, you could program the 396 with an "A" tone of 0 and a "B" tone of 992.0, to monitor just calls that are sent to the entire group.

The 396 has an additional feature that allows one to monitor up to 10 different tone sets on the same frequency. As long as the Frequency, Modulation and Attenuator settings are the same, the radio will open on any tone set programmed in. Each tone set can have a different Alert set, so that each station will beep differently. From our example above, you can program each station individually with both its "A" and "B" tones and the radio will open on the individual station's calls.

For areas that use 1+1 tone alerting, the Uniden BCD396T and siblings with the Fire Tone Out feature provides an exciting facet of the scanning hobby. It allows users to leave the radio silent until a call is received and also allows one to pick and chose more easily the calls he wishes to hear. While the 396 will not display decoded tones like it does PL tones, that feature may eventually be part of future radios.

About the author:

Rich Carlson is a Director of the Chicago Area Radio Monitoring Association (CARMA, www.carmachicago.com) and has been a Public Safety professional for 27 years. He can be reached at rich@n9jig.com.

TABLE 1: (CENTRACOM II 4 DIGIT CODE PREFIXES)

Prefix	A Grp	B Grp						
00	P2	Z	15	5	5	2B	4	G2
01	10	10	16	2	1	2C	4	G3
02	3	10	17	4	5	2D	4	P1
03	10	3	18	5	4	2#	4	P2
04	4	10	19	2	4	2*	5	G1
05	10	4	1A	2	G2			
06	5	10	1B	2	G3	30	Z	P1
07	10	5	1C	2	P1	31	1	3
08	6	10	1D	2	P2	32	3	1
09	10	6	1#	3	G1	33	2	3
0A	1	G1	1*	3	G2	34	3	2
0B	1	G2				35	3	4
0C	1	G3	20	6	6	36	4	3
0D	1	P1	21	1	5	37	3	5
0#	1	P2	22	5	1	38	5	3
0*	2	G1	23	1	4	39	3	3
			24	4	1	3A	5	G3
			25	2	5	3B	5	P1
			26	5	2	3C	5	P2
10	4	2	27	Z	G1	3D	6	G1
11	1	1	28	Z	G2	3#	6	G2
12	2	2	29	Z	G3	3*	6	G3
13	1	2	2A	4	G1			
14	4	4						

502.5 D G41
742.5 # G16
982.5 * G32

Group G2

Tone	Button	Des
652.5	0	G10
607.5	1	G07
787.5	2	G19
2840.0	3	
877.5	4	G25
922.5	5	G28
967.5	6	G31
517.5	7	G01
562.5	8	G04
697.5	9	G13
997.5	A	G33
1207.5	B	G51
1027.5	C	G35
1042.5	D	G36
1057.5	#	G37
1077.5	*	G38

Group G3

Tone	Button	Des
667.5	0	G11
712.5	1	G14
772.5	2	G18
817.5	3	G21
862.5	4	G24
907.5	5	G27
952.5	6	G30
532.5	7	G02

577.5 8 G05
622.5 9 G08
1087.5 A G39
1102.5 B G40
1117.5 C G45
1132.5 D G46
1147.5 # G47
1177.5 * G49

Group P1

Tone	Button	Des
1743.0	0	P24
1820.0	1	P25
1901.0	2	P26
1985.0	3	P27
2073.0	4	P28
2164.0	5	P29
2260.0	6	P30
2361.0	7	P31
2465.0	8	P32
2575.0	9	P33
2688.0	A	P34
2807.0	B	P35
2932.0	C	P36
3062.0	D	P37
294.7	#	
307.8	*	P40

Group P2

Tone	Button	Des
1220.0	0	B02
335.6	1	P42
350.5	2	P43

366.0 3 P44
382.3 4 P45
399.2 5 P46
416.9 6 P47
435.3 7 P48
454.6 8 P49
474.8 9 P50
495.8 A P51
1120.0 B B11
540.7 C P53
564.7 D P54
589.7 # P55
615.8 * P56

Group Z

Tone	Button	Des
346.7	0	CZ
384.6	1	DZ
426.6	2	EZ
473.2	3	FZ
524.8	4	GZ
582.1	5	HZ
645.7	6	JZ
716.1	7	KZ
794.3	8	LZ
881.0	9	MZ
977.2	A	NZ
1084.0	B	PZ
312.6	C	BZ
2250.0	D	
2612.0	#	R12
None	Z	* None

410.8	1	4	114	Motorola
412.1	B	1	DB	QC-I
416.9	P2	6	P47	Plectron
422.1	4	5	145	Motorola
426.6	Z	2	EZ	QC-I
433.7	1	5	115	Motorola
435.3	P2	7	P48	Plectron
441.6	A	2	EA	QC-I
445.7	4	6	146	Motorola
454.6	P2	8	P49	Plectron
457.1	B	2	EB	QC-I
457.5			G44	GE Use 457.1
457.9	1	6	116	Motorola
470.5	4	7	147	Motorola
472.5	G1	B	G43	GE
473.2	Z	3	FZ	QC-I
474.8	P2	9	P50	Plectron
483.5	1	7	117	Motorola
487.5	G1	C	G42	GE
489.8	A	3	FA	QC-I
495.8	P2	A	P51	Plectron
496.8	4	8	148	Motorola
502.5	G1	D	G41	GE
507.0	B	3	FB	QC-I
510.5	1	8	118	Motorola
517.5	G2	7	G01	GE
517.8			P52	Plectron/Use 517.5
524.6	4	9	149	Motorola
524.8	Z	4	GZ	QC-I
532.5	G3	7	G02	GE
539.0	1	9	119	Motorola
540.7	P2	C	P53	Plectron
543.3	A	4	GA	QC-I
547.5	G1	7	G03	GE
553.9	5	0	150	Motorola
562.3	B	4	GB	QC-I
562.5	G2	8	G04	GE
564.7	P2	D	P54	Plectron
569.1	2	0	120	Motorola
577.5	G3	8	G05	GE
582.1	Z	5	HZ	QC-I
584.8	5	1	151	Motorola
588.9			R55	Reach Not Sup- ported
589.7	P2	#	P55	Plectron
592.5	G1	1	G06	GE
600.9	2	1	121	Motorola
602.6	A	5	HA	QC-I
607.5	G2	1	G07	GE
609.0			R54	Reach/Use 607.5
615.8	P2	*	P56	Plectron
617.4	5	2	152	Motorola
622.5	G3	9	G08	GE
623.7	B	5	HB	QC-I
625.0	3	A	None	Custom
631.0			R53	Reach Not Sup- ported
634.5	2	2	122	Motorola
637.5	G1	9	G09	GE
643.0	5	B	P01	Plectron
645.7	Z	6	JZ	QC-I
651.9	5	3	153	Motorola
652.5	G2	0	G10	GE
653.0			R52	Reach/Use 652.5
667.5	G3	0	G11	GE
668.3	A	6	JA	QC-I
669.9	2	3	123	Motorola
672.0	5	C	P02	Plectron
676.0			R51	Reach Not Sup- ported
682.5	G1	0	G12	GE
688.3	5	4	154	Motorola
691.8	B	6	JB	QC-I
692.0			F02	Federal/Use 691.8
697.5	G2	9	G13	GE
700.0			R50	Reach/Use 701.0
701.0	5	D	P03	Plectron
707.3	2	4	124	Motorola

continued on page 66

TABLE 2 A

NON SUPPORTED OR ALTERNATELY
ASSIGNED TONES

Tone	Des.	Company	Notes
321.4	P41	Plectron	(Use 321.7)
457.5	G44	GE (Use 457.1)	
517.8	P52	Plectron	(Use 517.5)
588.9	R55	Reach	(Not Supported)
609.0	R54	Reach	(Use 607.5)
631.0	R53	Reach	(Not Supported)
653.0	R52	Reach	(Use 652.5)
676.0	R51	Reach	(Not Supported)
692.0	F02	Federal	(Use 691.8)
700.0	R50	Reach	(Use 701.0)
725.0	R49	Reach	(Use 726.8)
750.0	R48	Reach	(Use 749.0)
776.0	R47	Reach	(Not Supported)
804.0	R46	Reach	(Use 802.5)
810.0	F04	Federal	(Use 810.2)
832.0	R45	Reach	(Use 832.0)
862.0	R44	Reach	(Use 862.5)
877.0	F05	Federal	(Use 877.5)
892.0	R43	Reach	(Use 892.5)
923.0	R42	Reach	(Use 922.5)
949.0	F06	Federal	(Use 949.5)
950.0	P10	Plectron	(Use 949.5)
956.0	R41	Reach	(Not Supported)
990.0	R40	Reach	(Use 992.0)
1012.5	G34	GE (Use 1011.6)	
1025.0	R39	Reach	(Use 1025.0)
1061.0	R38	Reach	(Use 1063.2)

Tone	Des.	Company	Notes
1098.0	R37	Reach	(Use 1102.5)
1137.0	R36	Reach	(Not Supported)
1162.5	G48	GE (Use 1161.4)	
1177.0	R35	Reach	(Use 1177.5)
1219.0	R34	Reach	(Use 1220.0)
1261.0	R33	Reach	(Not Supported)
1287.0	P17	Plectron	(Use 1285.8)
1306.0	R32	Reach	(Not Supported)
1320.0	B15	(Not Supported)	
1352.0	R31	Reach	(Use 1355.0)
1449.0	R29	Reach	(Use 1450.0)
1553.0	R27	Reach	(Use 1555.2)
1608.0	R26	Reach	(Not Supported)
1664.0	R25	Reach	(Not Supported)

1723.0	R24	Reach	(Not Supported)
1780.0	F14	Federal	(Use 1781.5)
1784.0	R23	Reach	(Use 1781.5)
1847.0	R22	Reach	(Not Supported)
1912.0	R21	Reach	(Not Supported)
1980.0	R20	Reach	(Use 1985.0)
2049.0	R19	Reach	(Not Supported)
2121.0	R18	Reach	(Not Supported)
2196.0	R17	Reach	(Not Supported)
2274.0	R16	Reach	(Use 2271.7)
2354.0	R15	Reach	(Not Supported)
2437.0	R14	Reach	(Use 2440.0)
2523.0	R13	Reach	(Not Supported)
2704.0	R11	Reach	(Not Supported)

TABLE 3:

ALL TONES, SORTED BY TONE VALUE

Tone	Grp	Bttn	Des.	Comp./Notes
288.5	3	1	138	Motorola
294.7	P1	#	None	Custom
296.5	3	2	108	Motorola
304.7	3	3	139	Motorola
307.8	P1	*	P40	Plectron
312.6	Z	C	BZ	Custom
313.0	3	4	109	Motorola
321.4			P41	Plectron/Use 321.7
321.7	4	0	140	Motorola
330.5	1	0	110	Motorola
335.6	P2	1	P42	Plectron
339.6	4	1	141	Motorola
346.7	Z	0	CZ	QC-I
349.0	1	1	111	Motorola
350.5	P2	2	P43	Plectron
358.6	4	2	142	Motorola
358.9	A	0	CA	QC-I
366.0	P2	3	P44	Plectron
368.5	1	2	112	Motorola
371.5	B	0	BB	QC-I
378.6	4	3	143	Motorola
382.3	P2	4	P45	Plectron
384.6	Z	1	DZ	QC-I
389.0	1	3	113	Motorola
398.1	A	1	DA	QC-I
399.2	P2	5	P46	Plectron
399.8	4	4	144	Motorola

IRIB: Islamic Republic of Iran Broadcasting

By Richard A. D'Angelo

The Middle East is always filled with interesting shortwave activity. International broadcasting to and from this region usually approaches fanatical proportions. The Islamic Republic of Iran is just one element in this complex puzzle.

Broadcasting within Iran is controlled by the state and largely reflects the views of the Ayatollah, or Supreme Leader, and the religious clerical establishment. Such tight control of the media often creates an atmosphere for opposition clandestine radio stations.

The Islamic Republic of Iran Broadcasting ("IRIB") is the state organization in charge of domestic and external broadcasting. The Voice of the Islamic Republic of Iran broadcasts in various languages and can be heard abroad on shortwave, medium wave and through the Internet. This article will cover Iran with emphasis on its external shortwave broadcasting service.

The Country

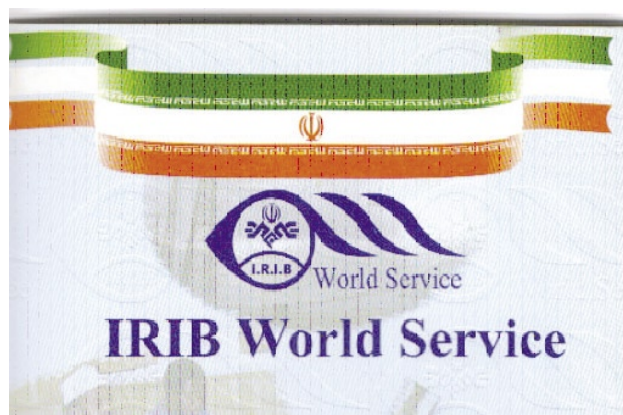
Iran is located in the Middle East, bordering the Gulf of Oman, the Persian Gulf, and the

Caspian Sea, between Iraq and Pakistan. The country's population is about seventy million. Iran was known as Persia until 1935, and it became an Islamic republic in 1979 after the ruling monarchy was overthrown and the shah was forced into exile. Conservative clerical forces established a theocratic system of government with ultimate political authority nominally vested in a learned religious scholar.

Iranian-US relations have been strained since a group of Iranian students seized the US Embassy in Tehran on 4 November 1979 and held it until 20 January 1981. During 1980-88, Iran fought a bloody, indecisive war with Iraq that eventually expanded into the Persian Gulf and led to clashes involving the US Navy and Iranian military forces between 1987-1988. Iran has been designated a state sponsor of terrorism for its activities in Lebanon and elsewhere in the world and it remains subject to US economic sanctions and export controls because of its continued involvement.

Following the elections of a reformist president and Majlis in the late 1990s, attempts to foster political reform in response to popular dissatisfaction have floundered as conservative politicians have prevented reform measures from being enacted, increased repressive measures, and consolidated their control over the government.

Iran's economy is considered an inefficient state controlled system with an over reliance on the oil sector. Private sector activity is typically small-scale, such as workshops, farming, and services. Relatively high oil prices have enabled Iran to amass many billions of dollars in foreign exchange reserves, but have not eased economic hardships such as high unemployment and inflation.



Broadcasting in Iran

Broadcasting commenced in Iran back in April 1940 with the news in five languages. The early days saw the station operate out of two rooms at the Tehran Telegraph Center. World War 2 slowed the development of broadcasting, until 1947 when new transmitters were installed. A new production center was completed in 1961.

Iranian Radio was part of the Ministry of Post, Telephones and Telegraph in the early years. Subsequent political juggling saw the broadcasting activity moved from various ministries over the years until the Islamic revolution of 1979 when radio and television became a part of the Islamic Republic of Iran Broadcasting.

The state continues to control all broadcasting in Iran. IRIB is a state run organization with domestic and overseas broadcasting responsibilities. It has been under the direction of Ezzatollah Zarghami since May 2004. He was one of the students who occupied the United States embassy in Tehran in 1979. There are no private, independent broadcasters within the country.

Since Director Zarghami has been in charge, there have been changes in style and content of programs carried by IRIB, moving away from a non-stop domestic diet of bland





IN THE NAME OF GOD
Verification Of Reception Report
Q.S.L

No:1

Dear: Richard D'Angelo

This is to officially confirm your reception of the voice of the Islamic Republic of Iran

Date	U.T.C		SW		MW	
	From	To	M.	Freq	M.	Freq
19-Nov-03	01:28	01:57		6020		

Thank you for listening to the.....English.....program of the voice of the Islamic Republic of Iran
Tune in again & keep in touch.

Islamic Republic of Iran Broadcasting
Add: Vali-e-asr Ave., Jame Jam St., P.O.Box : 19395-6767 Tehran-Iran

religious programming. However, the IRIB still maintains a strong centralized control over material broadcast by the station, which includes live coverage of parliament, Koran recitations and interpretations, prayers and programs on religion and ethics. Not exactly the most stimulating of program fare, but not unusual in this part of the world.

Upon his appointment in 2004, The Centre for Arab and Iranian Studies noted: "Ezatollah Zarghami the new head of IRIB, a sign of a return to conservative control of the broadcast media." That's why international broadcasting organizations transmit to this region and numerous clandestine radio transmissions find sizable audiences in the Middle East.

The station's main source of funding comes from the government's annual budget, although there is a small amount of income attributable to advertising and program sponsorship.

The IRIB operates eight nationwide domestic radio networks, a number of provincial stations, and an external service. On shortwave they broadcast under the name **The Voice of the Islamic Republic of Iran** ("VOIRI"), or the World Service. Most of the domestic medium wave and FM stations broadcast twenty-four hours a day.

The national network is the government's official voice and carries news and current affairs programs. Also, it transmits social, entertainment, cultural, economic, Islamic culture, knowledge, children and young adults, politics, and history programs.

The Station

The World Service of the Islamic Republic of Iran Broadcasting, VOIRI, produces radio programs in 30 different languages. Typically, broadcasts open with a recitation from the

Koran and are followed by a news update and a political commentary. Depending on recent events, the one commentary can expand to two or more! Other programs include general interest features compatible with the culture and language of a particular target area.

A major undertaking of IRIB World Service is the program *Let's Learn Farsi*, which the station says has been "warmly received" by their listening audience. Another popular program is *Listeners' Special*, a feedback based program that responds to messages sent in by listeners.

The IRIB World Service is divided into different departments based on geographic regions. The European and American Department broadcasts programs in English, German, Italian, Spanish, Russian, Albanian, Bosnian and French languages, targeting Asia, Europe, USA, Africa and Australia. It employs a large number of local and foreign correspondents. The North American service uses the *Voice of Justice* name for its English language programming. The tone is decidedly hostile, which is reminiscent of the old East vs. West philosophical battles during the Cold War era.

The Sub-continent and East Asian Department broadcasts programs addressing Muslim and non-Muslim audiences in Afghanistan, Pakistan, India, Bangladesh, Thailand, Malaysia, Singapore, Brunei, Indonesia, China and Japan. Broadcast languages include Pashto, Urdu, Dari, Bengali, Hindi, Malay, Chinese and Japanese. Native residents from these target areas comprise a major portion of the staff working these target regions.

The Central Asia, Northern Middle East and Caucasus Department broadcasts programs in Azeri, Assyrian, Armenian, Georgian, Turkish, Uzbek, Tajiki, Turkmen, Kazakh and Kurdish. The target areas for these programs are Turkey, Iraq, Azerbaijan, Turkmenistan,

Tajikistan, Kazakhstan, Kyrgyzstan and Georgia.

The Arab-African Department includes the *Voice of Palestine* and the *Familiar Voices* radio services which broadcast programs in Arabic twenty-four hours a day. Broadcast areas cover the Persian Gulf Arab States, Iraq, Syria, Lebanon, Jordan, Palestine, Saudi Arabia, Yemen, north and northeastern Africa, Europe and North America. News and news reports form a significant portion of the Arabic language radio programs. They cover the highlights of the world's top news stories and interviews with prominent political, cultural, scientific personalities outside of Iran.

There are two sub-divisions of the Arab-African Department. The Swahili Radio Department broadcasts programs for the native speaking people of Kenya, Tanzania, Congo, Rwanda and Burundi for an hour each day. The Hausa Radio Department broadcasts a one hour program each day for the native speakers in Cameroon, Nigeria, Niger, Ghana, Mali, Burkina Faso, Togo, Gambia, Cape Verde and Benin. Although not listed as a separate radio service, the radio station broadcasts programs for thirty minutes daily for the Hebrew speaking people of Palestine, Europe and North America. The program commenced in June 2002 under the name of *The Voice of David*.

The station can be heard regularly in English. Its 1030-1130 UTC transmission on 15460 kHz and 15480 kHz is targeted to the Indian Sub-Continent. There is another transmission to the same region at 1530-1630 UTC on 7330 kHz and 9940 kHz. A transmission to Europe is heard at 1930-2030 UTC on 6010 kHz, 7320 kHz, 9855 kHz, 9925 kHz, and 11,695 kHz. Finally, the final English transmission is targeted to North America under the *Voice of Justice* banner from 0130-0230 UTC on 6120 kHz and 9665 kHz. Times and frequencies are always subject to change, so keep your eyes open to Gayle Van Horn and Glenn Hauser's columns for the latest and most up-to-date information.

The World Service of the Islamic Republic of Iran Broadcasting is an excellent verifier of shortwave listener reception reports. Return postage is not necessary. English language postal reception reports can be sent to the station at:

IRIB English Service
P. O. Box 19395-6767
Tehran
Islamic Republic of Iran

The station also accepts electronic reception reports at englishradio@irib.ir. Postal responses include a full data picture QSL card of a significant site in the country or cultural artifact, program schedule information and all sorts of literature reflecting the religious and cultural aspects of the country. You will know your QSL has arrived when a big package of material arrives at your front door one day.

Remember to send in those VOIRI or IRIB World Service logs to the *Broadcast Logs* column edited by Gayle Van Horn and QSL verifications to *QSL Report* also edited by Gayle. Good luck with this DX target!

MT Satellite Review 2006

By Ken Reitz

Satellite broadcast Direct-To-Home (DTH) in the U.S. is nearly 30 years old with some 27 million subscribers nationwide. Satellite radio, only in its fifth year, has already racked up over 12 million paying customers. Millions of others are tuning into free programming on digital and analog satellite TV and radio. In addition, hundreds of thousands of customers are signing up for new high-speed Internet service via Ku-band satellite.

It's been an exceedingly profitable three decades for equipment manufacturers and programmers. Indeed, Charlie Ergen, DISH Network founder and original C-band equipment entrepreneur from the 1980s, has recently joined the elite of Forbes' list of U.S. billionaires*.

With so many companies chasing after your dwindling expendable income, which service should you choose and what equipment is right for you? Here's a review of the services, the companies, the equipment, the upsides and the downsides to all current satellite broadcasters.

DirecTV: Original DBS Service

Trying to decide which small dish service to subscribe to boils down to one issue: Are you an NFL fan? DirecTV has the rights to broadcast all NFL games and has a number of packages available to football fans. Its only competitor, DISH Network, is left broadcasting NFL games which are on the various ESPN and FOX sports networks, as well as the new NFL Network.

DirecTV HD programming is very slow in developing and lags significantly behind DISH Network's offerings. DirecTV has signed XM satellite radio for rights to rebroadcast its music channels, but to receive them you must sign up for the second level programming package. DirecTV does offer a more extensive list of Pay-Per-View movies.

DISH Network

DISH scored a High Definition (HD) coup by scooping up the remains of the bankrupt VOOOM HD satellite service. The result is the most extensive line-up of HD programming available on satellite. They have also switched to a new MPEG4 transmission scheme.

Their new ViP 211 and 622 HD series receivers are the most versatile available. These receivers tune all the Standard Definition (SD) channels, HD channels, and include a built-in,

off-air, digital receiver which tunes HD and SD off-air channels. The receiver further allows all these channels to be set up in the on-screen interactive guide. However, the ViP receivers don't display the program data sent by the off-air stations and can't be used to record future programs. All programming, HD and SD, can be taped on a standard VHS tape recorder or you can upgrade to an HD digital recorder which is built-in to the 622 ViP receivers and is interactive. You'll incur an additional monthly charge for this capability.

DISH carries all the Sirius Satellite Radio music channels which are available at the lowest package rate. Consider the monthly "equipment lease" option (a \$49.99 one-time fee is applied) which means that for \$60/year (with the ViP 211) your receiver will be replaced if it stops working or new technology requires a receiver update at no additional cost. DISH Network receivers have a history of hardware and software problems. Without the lease option it could mean you'll have to replace the receiver at your expense after the initial warranty period. The lease puts all the risk on DISH Network.

C-Band: Obscure but Alive

The original satellite TV made its debut in the late 1970s as an experimental playground for serious electronics enthusiasts. Reception required a minimum 10 foot diameter dish. Cable TV and the big TV networks had just begun using the C-band satellites to distribute their signals around the nation and, of course, all transmissions were in the clear. Popularity of the big dish peaked around the early 1990s at over 3 million installations.

A precipitous decline to its current status of some several hundred thousand followed the introduction of DBS small dish services DirecTV and DISH Network. It's not clear exactly how many viewers are still using the big dish, but the number of paid subscribers is around a quarter million. Here's what you'll need to tune in and what you'll see:

Analog

Virtually any analog satellite TV receiver will still work today to receive any of the dozens of analog channels available. You'll need a dish (the bigger the better) equipped with a C and/or Ku-band LNB, control wires (RG/6 coax, dish drive cables and polarity change wires) and an

analog receiver. Entire working systems can be had for free from any number of places where you live. Abandoned big dish systems pepper the landscape nationwide. Brand new systems may be ordered from Skyvision (see info list).

Among the audio and video services you can tune in, are ABC-TV Network, PBS-TV Network, numerous religious and shopping channels, C-SPAN and C-SPANII, numerous pro and college stadium back hauls, satellite news gathering (SNG) live feeds and more. The addition of a VideoCipherII decoder module allows you to subscribe, a la carte, to the most popular cable-TV channels such as ESPN, The Weather Channel, CNN, premium movie channels and two adult XXX services.

4DTV

More than ten years ago cable broadcasters began switching to digital modes to reduce transmission costs and increase available channel numbers. The digital system most widely used by cable TV broadcasters is the DigiCipherII system by Motorola. A consumer version of this satellite receiver, called the 4DTV, is still being sold to the public.



Motorola's 4DTV analog/digital C/Ku-band receiver is the best big dish receiver available. Look for a limited number of these factory re-conditioned at deep discounts from Skyvision. (Courtesy: Skyvision.com)

While it made hundreds of digital audio and video services available to the home consumer, it couldn't compete with the main attraction of the emerging small dish which was that DBS dishes were 1/10th the size. Still, the hundreds of thousands who have stuck with the big dish and the 4DTV receiver tout its superior video and audio, the dozens of free 4DTV channels as well as the less expensive (when compared to cable-TV) a la carte subscription fees.

MPEGII FTA

The other digital mode used to broadcast satellite programming is the Digital Video Broadcast (DVB) standard known as MPEGII. It was first widely used in Europe and over the last 10



Complete MPEGII FTA satellite system: receiver, off-set dish, LNB and connecting cables. Easy installation has you watching and listening to the world. (Courtesy: smalllear.com)

years has seen wide spread acceptance in North America. This digital compression scheme allows broadcasters to cram up to 10 video streams into one satellite transponder.

If an individual stream is not encrypted it is said to be "Free To Air" (FTA). These transmissions may be viewed with any MPEGII FTA receiver. If a particular stream is encrypted, the viewer will need a decoding device in order to watch. Some MPEGII services such as Globecast (see below) offer receivers with built-in smart cards to allow subscriptions to the services. Most encrypted channels are not in a format viewable by normal MPEGII receivers. There are dozens of MPEGII FTA models available. Check out the list below for some places to look.

Receiver and Antenna



Globecast World TV offers an MPEGII FTA receiver with built-in smart card to decode its dozens of channels of foreign satellite TV and radio programming on IA5 for less than \$200. (Courtesy: Globecast World TV)

Globecast World TV

Owned by French Telecom, Globecast World TV provides a lengthy list of audio and video channels from around the world from its main location on Intelsat America 5 (IA5). They sell a complete reception system (dish, LNB, receiver with smart card) for under \$200 which is capable of tuning in these transmissions. A list of the channels and monthly or yearly subscription fees is available at www.globecastworldtv.com.

The Gray Market

Canada has two competing small dish

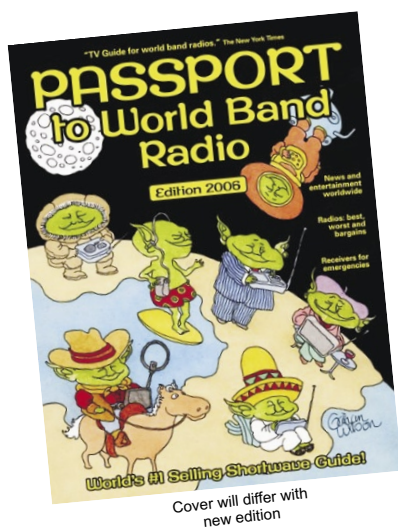
systems, StarChoice and ExpressVu. While the signals from these satellites cover most of the U.S. Canada is barred from selling programming on these systems stateside. However, you may purchase either system and install it yourself, but you'll have to subscribe through a third party with a Canadian address. This is known as Gray Market commerce, since it's not illegal to own a Canadian small dish system and since the address of the subscribed unit is technically in Canada.

The companies controlling the programming are, in fact, being paid for their services. There are several companies which provide such a Canadian address which in turn bill their American customers. Dish size for these Canadian services needs to be at least 75 cm for reception across the U.S. One place to buy StarChoice equipment is: www.global-cm.net/

The Black Market

There are MPEGII receivers which are easily bought via the Internet which allow consumers to watch all programming on either DirectTV or DISH Network for free. These units are sold openly and there is no mistake as to what they are capable of doing. It is illegal to watch encrypted programming for which you have not paid. It's known as "signal theft" and there is a hefty fine and prison sentence in store for those who are caught.

Both small dish companies recognize that this happens and periodically send out "electronic counter measures" (ECM's) via their data stream which causes the black box receivers to stop receiving the free programming. However,



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within short order a software fix is found and new hacked smart cards are mailed to black box subscribers, which brings them back to life. So, if you're going to subscribe to a black box service, why not just get a legitimate DirecTV or DISH Network system and subscribe? In the long run the price may be the same and there's no legal risk!

DMX Direct-To-Home Service

Music aficionados and audiophiles are always on the lookout for vast quantities of great music and excellent audio fidelity. While satellite radio offers music in great gobs, the fidelity is on the low end of the spectrum. There is, however, one stand-alone Ku-band music system which delivers on both counts: DMX Direct-To-Home. This is a one hundred plus channel satellite music service which uses its own proprietary receiver to deliver AC3 quality music to your stereo without commercials or announcers.

The catch is that DMX is also the worst run satellite broadcasting company in the U.S. They've been in and out of bankruptcy for years. While their main interest is providing music content to the digital cable industry, and business background music, they do sell subscriptions to individual homes, but it's tough to find someone who will sell the service. Their web site is nearly useless. It's possible to buy a used receiver and hook it up to your own Ku-band dish to receive the signal. Once you get a lock on the signal you can call their center to subscribe. It's pricey at \$240/year, but the channel line-up and audio quality still beats the music heard on XM or Sirius.

You can find a list of channels available from DMX here: www.dmxmusic.com/guide/dbs.html To find out more go to www.dmx-music.com/index.asp and the DMX Customer Support line is: 800-362-8863 and Good Luck!

XM Satellite Radio

First out of the gate in October 2001, XM radio also has the most subscribers of the two satellite radio services. XM offers a wide range of channels from celebrity disk jockeys such as Bob Dylan to every Major League Baseball game play-by-play. You get all this at a reasonable price of \$12.95/month with FM quality fidelity and portability. The play list on many of the channels is surprisingly small for such a potentially broad platform. Still, it's galaxies away from the meager pickings most people have to choose from



Delphi Roady XT XM Satellite radio works in your car or at home with appropriate kits. At \$39.99 (with rebates) it's hard not to sign up! (Courtesy: Crutchfield)

on their local FM band. If you've had XM and canceled your subscription, wait a few months. They'll be contacting you with an offer you can't refuse: slashing \$3/month off their usual monthly fee. For more info: www.xmradio.com

Sirius Satellite Radio

With satellite radio the question is: Are you an NFL fan? Sirius is the home to NFL football and their top celebrity is Howard Stern. And, if you don't tire of him live, you'll be thrilled to know Sirius has just signed a deal with his former bosses at CBS to provide endless years of his show in audio re-run. Sirius programming is so similar to XM's as to be mistaken for the same, but their announcers are more intrusive.

From a shortwave point of view, XM is now better: it carries the full BBC World Service, while Sirius has only the BBC Headline service. Both carry World Radio Network. XM has Bob Edwards on XM Public Radio; Sirius has more Public Radio channels but more repeats. Sirius is also \$12.95/month and also offers big discounts for extended subscriptions. For more info: www.siriusradio.com

HughesNet

Formerly DirecPC and DirecWay, Hughes Net is still trying to provide a high speed data service to those who aren't near a DSL or digital cable line. This service uses a small Ku-band system to receive and transmit Internet data. For that reason you must have the unit installed by a certified installer.

Whenever you see data for a satellite-delivered high speed Internet service, be aware that you're looking at the most optimistic hopes. HughesNet Home service claims up to 700 Kbps download and up to 128 Kbps upload. They also offer HughesNet Professional service which claims up to 1 Mbps download and 200 Kbps upload. Both services include up to 5 e-mail accounts, 24/7 live tech support and a term commitment of 15 months.

It's not cheap: You'll need to fork over \$600 up front which includes the equipment (\$400) and installation (\$200). After that is \$59.95/month for the home service or \$69.95/month for the pro service. Other plans and promotions will doubtless follow because of stiff competition from Wild Blue (see below). For more information go to: www.hughesnet.com

WildBlue

New kid on the digital satellite Internet block is WildBlue. It also uses a stand-alone Ku-band uplink/downlink system which must be professionally installed. With higher claimed speeds, cheaper monthly prices and free installation, WildBlue is set to pound HughesNet. As of this writing WildBlue is offering their service at half that of HughesNet: \$300 equipment price and free installation. They have three tiers of service: .512, 1.0 or 1.5 Mbps download speed and it's priced accordingly: \$49.99 (Value Pak), \$69.99 (SelectPak) and \$79.99/month (ProPak).

For more information go to: www.wildblue.com Both HughesNet and WildBlue have contract information on their web sites regarding



WildBlue, new kid on the Internet Satellite Service block, offers high speed Internet to the hinterlands at up to 1.5 Mbps through this small Ku-band dish. (Courtesy: WildBlue)

your obligations and theirs. Read them carefully before you sign up.

**He's #80 of 746 listed. According to Forbes at 53 years old Ergen is said to be worth \$6.7 billion. Maybe the monthly fees are a little high.*

C-BAND SATELLITE TV SOURCES

SKYVISION

800-500-9275 www.skyvision.com

Sells analog, digital receivers, dishes of all sizes and replacement parts.

DAVE'S HOBBY SHOP

479-471-0751 www.daveswebshop.com

Sells big and small dish systems and related gear.

MPEGII FTA SOURCES:

www.dvbexpress.com

www.sadoun.com

www.global-cm.net

<http://buydvb.com/securestore/index.cgi?code=3&cat=2>

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LEGAL RIGHTS

Your right to install a small dish is protected by the FCC whose rules supersede the state and local laws promulgated on behalf of cable companies. If you have issues with your local Home Owner's Association or subdivision, contact the Satellite Broadcasting and Communications Association (SBCA) for help: www.sbca.com/otard/default.htm

A copy of the FCC's July 2005 ruling on Over-The-Air Reception Devices (OTARD) is found here: www.fcc.gov/mb/facts/otard.html

Cruising the Caribbean

By Bob Grove

It's a balmy day here on deck of the *Fantasy* – a modern, enormous, floating city, part of the dozen-ship fleet of Carnival Cruise Lines. And even though the sea is quite choppy, an elaborate set of stabilizer fins has been deployed to resist the rolling of the ship, making me feel like we're not really in motion.

Not surprisingly, the maintenance of this gigantic vessel and the service to its passengers are staggering. During a typical week, the galley produces more than 100 tons of food to serve over 3000 happy vacationers and crew members. In addition, 6000 gallons of alcoholic beverages are served; thank goodness the passengers aren't driving! Palatable water for drinking and washing is continuously generated by a high-volume saltwater desalinator.

The *Fantasy* was built in Helsinki, Finland, in 1990 at a cost of nearly a quarter-billion dollars, and carries a Panamanian registry. It's a mid-size in this fleet, but it's the most popular among the crew; it's not too big, and it's not too small – it's just right!

Even so, the 70,000 ton *Fantasy* is nearly 900 feet long (that's the length of three football fields!), and over 100 feet wide, yet this behemoth can move through the waters at a respectable 21 knots, thanks to the six diesel-electric motors which generate 50,000 horsepower.

As with any service-oriented business, customer relations are key to its success; aboard the *Fantasy*, the friendly, courteous help was exemplary. The crew is an ethnic blend claiming some 80 world nations, contributing their cultural attributes in food and porter services, information specialties, administration, entertainment, security and navigation.

Communications and Electronics

Every large vessel has a high bridge to afford the navigation team a good view of the horizon. The bridge on the *Fantasy* is festooned with some



30 antennas – vertical whips, Yagi arrays, radar and three radomes to protect those communications antennas.

Although the time-honored radio room has now been abandoned, the bridge teems with computerized electronics of every imaginable kind. GPS position indicators back up the gyro compass to provide an accurate reference for navigation. Depth sounders continuously sample the ocean floor for proper draft.

Three independent radar systems constantly scan the surface for weather and for other vessels. The lower-frequency radar is better for penetrating fog and rain, while the higher-frequency radar delivers sharper resolution of the targets.

Safety of the passengers is the prime directive, and panels of LEDs are mounted on level-by-level drawings of the entire ship, visibly flagging any areas of concern – smoke and fire detectors, door and hatch positions, alarms, power distribution and more.

Monitoring the *Fantasy*

HF ship to shore (SSB) is used for deep-ocean communications (Panamanian callsign H3GS), but for shorter range, the *Fantasy* uses standard VHF-FM marine band channels for ship to ship, and ship to shore. On board, communications are conducted by VHF and UHF handie-talkies; digital paging also calls crew members.

Due to strict security measures enacted after 9/11, passengers are no longer invited to visit the elaborate bridge, and during check-in at the harbor terminal, passengers are prohibited from using any kind of communications devices (scan-



ners, FRS transceivers, ham radio, etc.); outside the terminal, however, and on board, there was radio activity to be heard.

MARINE CHANNELS

156.300	Ch. 6 (intership safety)
156.600	Ch. 12 (port operations)
156.675	Ch. 73 (port operations/ship to cruise terminal)
156.725	Ch. 74 (port operations/ship to ship)
156.800	Ch. 16 (calling and emergency)
156.975	Ch. 79 (administration)

UHF SIMPLEX

457.575	Ship digital paging
464.500	Cruise terminal security
467.500	Crew communications

SHIP UHF REPEATER

Output	Input
457.5250	467.7500
457.5750	467.8000

A final thanks

I would be remiss not to express my gratitude to the professional team which provided this unique opportunity to learn the workings of the *Fantasy*: Captain Giulio Basso, Chief Purser Darwin Hasfian, First Officer Antonio Cellie, Second Officer Mario Grammatica, and members of the service crew who displayed warmth and friendliness throughout our cruise.



Take a Radio Vacation

Still have a little vacation left this summer and don't know where to go? Skip the crowds at the beach and the long trek into the mountains. Take your radio hobby on vacation to any one of dozens of radio related museums and other "road-side attractions." Here are just a few.

American Museum of Radio and Electricity

Located in Bellingham, Washington, the American Museum of Radio and Electricity is a small private radio museum which plans to move to bigger facilities. It recently launched its own FCC approved low-power FM radio station broadcasting from the museum under the call sign KMRE-LP 102.3 MHz. The station airs programming from the golden age of radio, the 1930s and '40s.

The museum is also home to the Mid-night Mystery Players presenting actual old time radio mysteries live from the museum and broadcast on their own station. The American Museum of Radio is open Wed-Sat 11:00 a.m. to 4:00 p.m. and charges \$5 adult and \$2 for children 12 years and under. For more information call: 360-738-3886 or visit: www.americanradiomuseum.org

Antique Wireless Association Museum

Truly a labor of love among radio enthusiasts since 1952, the AWA museum features an array of exhibits which include broadcast, amateur, maritime and telegraphy displays. The AWA museum is privately funded and

maintained. Their annual conference is held this year August 23-26 in Rochester, New York. The conference site is just 26 miles from the AWA Museum. Among the planned programs at this year's conference is a forum on radio restoration with *MT*'s Marc Ellis. You'll also get a chance to buy some very nicely restored old radios and other radio related artifacts.

For details on the AWA conference go to: www.antiquewireless.org/otb/2006conf.htm You can join the AWA for \$20/year membership dues, which includes a subscription to *The Old Timer's Bulletin* (now called the *AWA Journal*), a cover-to-cover "must read" for any old time radio enthusiast (edited by Marc Ellis).

Indiana Historic Radio Museum

Located in Ligonier, northern Indiana, the Indianan Historic Radio Museum is open Tuesday-Saturday from April through October 10:00 a.m. to 3:00 p.m. It's part of the Indiana Historical Radio Society, which also operates low power WNRL-FM (105.9 MHz) community radio for the West Noble area playing music from the 1940s and '50s. The Society publishes a quarterly bulletin featuring articles on old time radio and radio restoration which is mailed to members. For more information call 888-417-3562 or visit home.att.net/~indianahistoricalradio/ihrp6mus.htm

Museum of Broadcast Communications

Chicago knows broadcasting, since many broadcast pioneers and radio stations are from the midwest. This museum is so new it won't open until next year, but it might be worth noting on your vacation calendar for next summer. The 70,000 square foot museum is at the corner of State and Kinzie Streets in Chicago's South Loop. This museum also houses the National Radio Hall of Fame. For more info call: 312-245-8200 or visit: www.museum.tv

Museum of Radio & Technology

Near the tri-state corners of West Virginia, Ohio, and Kentucky, this museum lives in a former elementary school in Huntington and houses over 10,000 square feet of radio related exhibits, including military, ham, vintage Hi-Fi, and old time radios. The museum is open only on Saturday (10:00 a.m. - 4:00 p.m.) and Sunday (1:00 - 4:00 p.m.). There is no charge for admission. For more information call: 304-525-8890 or visit oak.cats.ohiou.edu/~postr/MRT/index.htm

Museum of Television and Radio

This is a museum so big that it took two coasts to contain it! Yes, you can visit the MTR East (NY) or the MTR West (LA), but don't look for any radio or TV artifacts. It's home to America's TV shows! This museum, founded in 1976 by former CBS President William S. Paley, was designed to preserve "our own cultural history - and to let this collection be accessible to the general public walking in off the street." Check out the NYC address (25 West 52nd St.) or the LA address in Beverly Hills (465 N. Beverly Drive). For more details visit www.mtr.org/index.htm

New England Wireless & Steam Museum

In East Greenwich, Rhode Island, the New England Wireless & Steam Museum provides a glimpse of radio through the last century. Exhibits include a real spark-operated ship to shore radio station, circa 1907, with the call sign PJ (Port Judith, RI); a recently added AM ham station; and several other functioning amateur stations. Dozens of early broadcast and shortwave receivers are on display in this well planned museum, which includes extensive exhibits about the use of steam power.



Collins Wireless
Telephone
Inductive Model
1909



It's entirely run by volunteers and they don't have the staff to take individual walk-ins. They mainly take pre-arranged tour groups, such as schools and clubs, but, if you call ahead and arrange to be there on a Thursday between 9:00 a.m. and 4:30 p.m., you'll have better luck



being shown around. It could well be worth the trouble. The New England Wireless and Steam Museum, Inc. 1300 Frenchtown Road, East Greenwich, RI 02818-1424 Robert Merriam, Director / Telephone 401-885-0545 users.ids.net/~newsm/Wireless/Massie/massie.html

Pavek Museum of Broadcasting

This museum in St. Louis Park, MN, highlights the importance of the Twin Cities in American broadcast history with more than a thousand radios and TV sets. Exhibits include hands-on electricity experiments for kids and a state-of-the-art ham shack for licensed hams to use. Admission is \$6 adults, \$5 seniors and children. The museum will be closed from July 1 to August 31 for renovations and repairs. Might make a great Labor Day trip for radio enthusiasts in the midwest. For more info: call 952-926-8198 or visit www.pavekmuseum.org/

Radio-Television Museum

Opened in 1999, the Radio-Television Museum is operated by the Radio History Society and located in Bowie, Maryland, just off U.S. route 50 and the D.C. Beltway. Open Friday (10:00 a.m.) and Saturday and Sunday from 1:00 to 5:00 p.m. There are hundreds of radio and television artifacts on display, and visitors are invited to join the Radio History Society. For details visit: www.radiohistory.org or call 301-390-1020.

The Smithsonian Institution's National Museum of American History

This should be the best of all radio museums, but its radio related material is combined with the "Information Age" exhibit which earlier this summer was in total disarray as they were in the process of a complete makeover for this part of the museum. What's left of their displays will remain open until September 5 after, which this section will be closed until Summer '08. Among the exhibits expected to undergo change could be the amateur radio station NN3SI, a literal hole in the wall where an operator tunes in the world via antenna array on the roof of the building. Catch it while you can on the National Mall in Washington, D.C.

Southern Appalachian Radio Museum

Located near downtown Asheville, North Carolina, this small private museum is open only on Fridays from 1:00 to 3:00 p.m. For directions and more information, visit www.saradiomuseum.org, which also has telephone contact numbers for the folks involved with the museum. Among its exhibits is an amateur radio station W4AFM and many old broadcast radios.

U.S. Army Signal Corps Museum

The Signal Corps Museum traces the corps from its beginnings in 1860 during the U.S. Civil War to the present with artifacts from all periods on display. Located at Fort Gordon, Georgia, this museum is open Tuesday-Friday 8:00 a.m. to 4:00 p.m. and Saturday 10:00 a.m. - 4:00 p.m. (closed on Federal holidays) Admission is free and it's open to the general public. Tours are self-guided, but group tours may be arranged in advance. Info: call 706-791-2818 or visit www.gordon.army.mil/ocos/Museum/default.asp

U.S. Army Communications – Electronics Museum

Ft. Monmouth, New Jersey, is the site of the U.S. Army Communications-Electronics Museum which is open Monday-Friday 12:00 to 4:00 p.m. Admission is free. Artifacts and photos in the exhibits tell the progress of Army electronic communications, including the first radio equipped weather balloon in 1928, aircraft detection RADAR in 1938 and the feasibility of space communications in 1946. For directions and info: www.fieldtrip.com/nj/85322440.htm or call the museum at: 732-532-2440.

U.S. Marconi Museum

Established by the Guglielmo Marconi Foundation (18 North Amherst Road Bedford, NH 03110) Call: 603-472-8312 or visit: www.marconi-usa.org/ Marconi spent many childhood years in New Bedford and so the link with this New England town and the "father of radio."



Western Historic Radio Museum

Home of vintage radio equipment from 1910 to the 1950s, this museum is located in Virginia City, Nevada, and open from 10:00 a.m. to 5:00 p.m. (April through October) Monday through Saturday. Exhibits include complete ham shacks from the 1930s and 1950s, and M.H. Dodd's complete 1912 wireless station among many others. There is a wealth of historic photos and well written text concerning the development of radio in the western U.S. If you can't make it to the museum, you can spend hours roaming the museum's virtual halls learning about the early days of radio. For more info: call 775-847-9047 or visit www.radioblvd.com/

Add Your Own

There are many dozens more radio related museums around the country which deserve attention. If you know of one in your area, send the information to the *Beginner's Corner* and I'll pass it on. Meanwhile, are you short on time and low on money? Crank up the AC, ice down your favorite beverage, and consider these on-line radio related sites:

Radio Era Archives claims to be the "largest old radio web site." Check out their extensive list of Zenith Trans-Oceanic radios. Unlike other museums, you can actually buy old radios here! www.radioera.com/transmuseum.htm

Tune in to hundreds of Old Time Radio shows via your computer at: www.radiolovers.com

Yesterday U.S.A. plays the old time radio shows 24/7 via internet, iPod, or satellite. Details on how to tune in are found at: www.yesterdayusa.com/home.html

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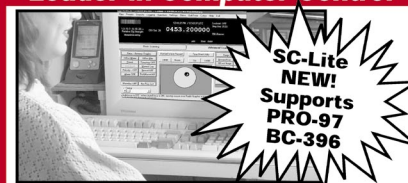
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Q. *My Grove Skywire runs through a nearby tree; is that likely to reduce shortwave reception? (Matt Stanley, email)*

A. It certainly is possible that a wet branch rubbing up against a high-impedance point on the antenna wire could introduce noise (static or fluctuating signal levels). It's better to have the wire clear of the tree.

Q. *You recommend low-loss RG-6/U coax for VHF/UHF reception; is it also good for shortwave listening? (James Ashe, Clearwater, FL)*

A. By all means. Transmission line losses get worse as the frequency increases, so any transmission line that works well at VHF/UHF will work even better at lower frequencies.

Q. *Why do I need to put a big receiving antenna on the roof when I can get the same gain from a small amplified antenna indoors? (Chris Oldham, Graham, NC)*

A. A preamplified antenna is not the answer if you don't have a good location for it, and inside a house with its electrically-noisy electrical wiring, and appliances, as well as shielding and reflections from metalized-Mylar insulation, aluminum siding, and heating/air conditioning ductwork is *not* a good location.

Added to that is amplifier-generated "hiss" (noise figure), intermodulation from strong-signal overload, the need for power, and general vulnerability to failure of electronic components. Any decent antenna you can put outside high and in the clear will work better than any amplified whip indoors.

Q. *I suspect that my home may be bugged by a listening device. Which is more sensitive to detect this, a scanner with "Close Call" signal response, a wideband RF detector, or a frequency counter? (Lou, email)*

A. I get this type of question frequently. The fact is, none of them is as sensitive as a receiver or scanner in its normal function, but any of them should pick up the discrete-frequency radiation from a hidden transmitter if it's close enough.

I have to point out, however, that serious

surveillance countermeasures professionals don't count on frequency counters, wideband RF detectors or scanners for their work; their number one instrument is the spectrum analyzer.

With that device you can simultaneously see all the signals on the spectrum of interest, and by carrying a small probe or receiving antenna around a room, you can watch the screen for one of the spikes to rise in amplitude as you approach the transmitter.

The limiting factor with all these instruments is that the offending device must be radiating a signal and within the frequency spectrum covered by the instrument. For it to be detected by a scanner, receiver or frequency counter, it must stay on one frequency. The spectrum analyzer, however, can even spot short bursts, spread spectrum and frequency hopping.

Q. *How would new federal ruling regarding spying on Americans affect the hobby of scanning and shortwave listening? (Pat Gonzales, email)*

A. This issue erupted when it was disclosed that the Bush administration had authorized the spying on Americans without a court order. Obviously, all Americans want to protect their right to privacy. I seriously doubt that any new legislation will impact the hobby of radio monitoring. The scanner debacle of several years ago came about through lobbying by the cellular industry, resulting in the removal of cellular telephone frequencies from scanners; it was already unlawful to listen to the contents of wireless telephone conversations.

Other forms of confidential radio transmissions are already scrambled for security.

Q. *I have installed an ANC-4 Noise Canceller on my Kenwood R5000 receiver which, in turn is connected to an outdoor antenna. I have considerable noise from neighboring residences, but the little noise-sensing whip on the top of the ANC-4 doesn't seem to be doing a thing to help reduce the noise. What am I doing wrong? (Myke, email).*

A. The ANC-4 does an excellent job, but the conditions must be right. Since the only noise-sensing antenna you are using is the attached whip, it is only hearing your own local noise. You need to attach a simple, outdoor wire as a sensing antenna so it can compare the neighbor-

ing noise with the signals coming in on your main antenna. Try several lengths and locations for best nulling.

Q. *There is a network of towers being erected around my county; the antennas are in sets of three, around the tower in a horizontal triangle pattern. Is this likely to be cellular telephone, or an 800 MHz trunking system? (Matthew Lofland, Chester County, PA)*

A. An antenna pattern consisting of a set of three short antennas evenly spaced around a tower is typical of a cellular telephone site.

Q. *Why can't scanner and short-wave antennas simply be attached directly to the radio instead of using coax as a feed line? (C. Cordell, GA)*

A. You certainly could do that, and it would work just fine except for one obstacle: It would be indoors where it would pick up electrical noise from household wiring and electrical appliances, as well as being shielded by metal lath and other constructional barriers to good reception.

Putting the antenna at some distance from the house reduces that pickup as well as makes signals more accessible, and the coax shielding prevents the intrusion of electrical noise when it runs indoors.

Q. *I own a PRO-96 digital Radio Shack scanner. There is a local agency that uses scrambling. Is it possible to unscramble it? (Steve Tripper, email)*

A. There are two kinds of scrambling: analog and digital. Analog still sounds like speech, just highly distorted and unintelligible; digital is just a "hiss." Since 1986 it has been illegal in the U.S. to own, import, manufacture or sell a descrambler to decode such private communications.

Questions or tips sent to Ask Bob, c/o MT are printed in this column as space permits. Mail your questions along with a self-addressed stamped envelope in care of MT, or e-mail to bobgrove@monitoringtimes.com. (Please include your name and address.)

Q. Does anyone know of a list of airline frequencies used at various airports? (Greg Brazil, San Francisco, CA)

A. This has been discussed for years on various internet radio venues, and the short answer is, if you want a list of airline VHF frequencies, you will have to monitor your local spectrum and compile it.

The longer answer is to provide a short overview. Our thanks go to Richard Ace Stutz, director of frequency management at Aviation Spectrum Resources Inc. (ASRI), for his help in sorting out the current situation regarding this service. The airline air-to-ground company frequencies can be monitored in the 128.825 - 132.000 MHz and the 136.500 - 136.975 MHz frequency ranges.

Up until the beginning of 2006, Aeronautical Radio, Inc. (ARINC) handled all aspects of this service exclusively. On January 1, 2006, a new company was carved out of ARINC, and they now handle all the licensing requirements of these air-to-ground frequencies for users in this part of the spectrum. This new service is now known as the ASRI Ground Station Administration (AGSA) Service.

ARINC still has a role in this band. They handle the radio equipment used by the airlines. So, if you want a new frequency for your airline or FBO, you contact ASRI for licensing/frequency management services, and you contact ARINC to lease the equipment you will use for that service.

While the Federal Communications Commission requires ASRI to file a license application with them to use a frequency in this spectrum, they do not have to disclose who they are contracting that license to. This information has always been closely guarded by the company and has never been released publicly. Even the airlines themselves hold this information on their individual VHF networks close to the vest.

The only exception to this rule has been the ARINC Air/Ground Domestic Voice Service that operates in this portion of the civilian aeronautical band. This is a shared network of almost 110 ARINC operated VHF stations in the United States and Canada. It provides reliable, high quality, blanket en route coverage above 20,000 feet in the continental United States, Hawaii, and on the coastal regions of western Canada and Alaska, as well as on-ground coverage at most major U.S. airports. The service allows aircrews and ground parties to immediately communicate about matters such as:

- Operational control and flight information
- Aircraft malfunctions and emergencies
- In-flight medical assistance
- Weather and destination airport information
- Aircraft diversions

This ARINC radio network is controlled from their San Francisco Communications Cen-

ter, where radio operators monitor VHF frequencies, receive and route calls, and transcribe and deliver messages 24 hours a day, 7 days a week. You can learn more about this service at http://www.arinc.com/products/voice_data_comm/air_ground_radio_svc/domestic.html.

Contrary to popular belief, there are no nationwide company frequencies in this subband except for 129.525 MHz, which is a nationwide de-icing freq during the winter months, and the ACARS data frequencies. Some frequencies like 129.200 MHz are heavily used by American Airlines, and 131.925 MHz by FedEx. But there are parts of the country where this is not the case.

Most of the hobby related material you see on the internet was obtained the old-fashioned scanner way – search, monitor, and analyze. I live just north of Atlanta and have spent 13 years monitoring and analyzing this band. Even today, I see changes in frequency usage almost daily. Airlines come and go, merge, or contract with others to conduct their air-to-ground company communications.

It is a fun thing to monitor at times, but there are long hours of boredom as well. I think that the biggest reason we don't see a lot more up-to-date information on this band is because most hobbyists find most of the airline comms boring and they don't waste their time listening to these frequencies. Putting together an accurate frequency list also requires the monitor to do some research and a bit of legwork to sort through what is being heard, and it seems a lot of today's scanner buffs aren't quite up to that challenge.

So, there is no magic list for company frequencies on the net and none will probably ever appear as long as the company who runs this operation does not release anything publicly about who they have licensed their frequencies to. If you want a frequency list for this one, you will have to flip the scanner into the search mode and do some old fashioned, extensive scanner monitoring.

Q. I've been trying for some time to obtain a list of present day HF airline company frequencies, but have been unable to find one. Do you know of a link to an up-to-date listing of them? It would sure be appreciated by me, and obviously a lot of others. Have really looked, long and hard, but on the internet can only find very old listings not presently used. (Bob via the internet)

A. According to Mr. Stutz at ASRI, the days of airline owned/operated company frequencies, commonly referred as Long Distance Operational Control or LDOC frequencies, are slowly coming to an end. ARINC is gradually taking over the HF air-to-ground business, both voice and data. Gone are familiar names like Berna, Cedar, and Universal. While a few companies such as British Airways (Speedbird) still operate HF LDOC networks, things are slowly shifting towards ARINC and their HF networks. Don't be surprised to see future ARINC air-to-ground HF remote stations established at HF Data Link (HFDL) transmission sites in the future. You can learn more about these ARINC nets at: http://www.arinc.com/products/voice_data_comm/air_ground_radio_svc/vsom.html.

The best list you can get is one you have compiled based on actual monitoring. Here are the internationally assigned HF LDOC frequencies on which to look for airline activity:

3007.0	3010.0	3013.0	3494.0	3497.0
4654.0	4687.0	5529.0	5532.0	5535.0
5538.0	5541.0	5544.0	6637.0	6640.0
6643.0	6646.0	8921.0	8924.0	8927.0
8930.0	8933.0	8936.0	10027.0	
10030.0	10033.0	10069.0	10072.0	
10075.0	10078.0	11342.0	11345.0	
11348.0	11351.0	11354.0	13324.0	
13327.0	13330.0	13333.0	13336.0	
13339.0	13342.0	13345.0	13348.0	
13351.0	17916.0	17919.0	17922.0	
17925.0	17928.0	17931.0	17934.0	
17937.0	17940.0	21940.0	21943.0	
21946.0	21949.0	21952.0	21955.0	
21958.0	21961.0	21964.0	21967.0	
21970.0	21973.0	21976.0	21979.0	
21982.0	21985.0	21988.0	21994.0	
21997.0				

If you are looking for ARINC HF activity, check out the following newly published frequency list from ARINC/ASRI:

SAN FRANCISCO (DIXON)
3494.0 6640.0 11342.0 13348.0
17925.0 21964.0

NEW YORK (RONOKONKOMA)
3494.0 6640.0 8933.0 10075.0
11342.0 13348.0 17925.0

MIAMI (SILVAIR, INC)
6637.0 8921.0 10033.0 13330.0
17940.0 21064.0

SANTA CRUZ, BOLIVIA
3494.0 6640.0 8933.0 10075.0 11342.0
13348.0 17925.0

BARROW, ALASKA
3013.0 3494.0 6640.0 8933.0 11342.0
13330.0 13348.0 17925.0 21964.0

Till next time, keep sending in those questions and good hunting, all.

Legality, Technology, and Interoperability

The ability of scanner listeners to hear police radio transmissions has been the subject of legislation as well as technological innovation. This month we take a look at Michigan's new scanner law and examine the unintended consequences of a Missouri county's move to digital technology. We also review radio frequencies set aside for interoperability and close with information about neighborhood emergency radio networks.

❖ Michigan Scanner Law

As of May 31, 2006, you no longer need a permit to legally possess a scanner in a vehicle in Michigan. The new law prohibits scanner possession by felons and persons in the commission of a crime, but otherwise allows them. The previous law flatly prohibited them in vehicles unless the operator had a special permit or was a licensed amateur radio operator. Although permits were available through the mail, many out-of-state visitors, especially NASCAR fans with race scanners on the way to the Michigan International Speedway, were unpleasantly surprised at the restriction.

Through the diligent work of State Representative Elsenheimer and other co-sponsors, the law now reads:

Sec. 508. (1) A person who has been convicted of 1 or more felonies during the preceding 5 years shall not carry or have in his or her possession a radio receiving set that will receive signals sent on a frequency assigned by the federal communications commission of the United States for police or other law enforcement, fire fighting, emergency medical, federal, state, or local corrections, or homeland security purposes. This subsection does not apply to a person who is licensed as an amateur radio operator by the federal communications commission. A person who violates this subsection is guilty of a misdemeanor punishable by imprisonment for not more than 1 year or a fine of not more than \$1,000.00, or both.

(2) A person shall not carry or have in his or her possession in the commission or attempted commission of a crime a radio receiving set that will receive signals sent on a frequency assigned by the federal communications commission of the United States for police or other law



enforcement, fire fighting, emergency medical, federal, state, or local corrections, or homeland security purposes. A person who violates this subsection is guilty of a crime as follows:

- (a)** If this subsection is violated in the commission or attempted commission of a misdemeanor punishable by a maximum term of imprisonment of at least 93 days but less than 1 year, the person is guilty of a misdemeanor punishable by imprisonment for not more than 1 year or a fine of not more than \$1,000.00, or both.
- (b)** If this subsection is violated in the commission or attempted commission of a misdemeanor or felony punishable by a maximum term of imprisonment of 1 year or more, the person is guilty of a felony punishable by imprisonment for not more than 2 years or a fine of not more than \$2,000.00, or both.
- (3)** Subsection (2) does not apply to a person who carries or has in his or her possession a radio receiving set described in subsection (2) in the commission or attempted commission of a misdemeanor punishable by a maximum term of imprisonment of less than 93 days.
- (4)** This section does not apply to the use of radar detectors.

Since it may take some time for police officers to become familiar with the new law, it would be prudent to keep a copy of the law in your glove compartment or somewhere close to your scanner. Should you be pulled over and questioned about your scanner, remaining polite and calm while showing the officer the actual text of the law will go a long way toward staying out of trouble.

❖ Michigan Radios

Although some law enforcement offi-

cials express concern about ordinary citizens monitoring police transmissions, a more serious risk can come from inside their own organizations.

In December 2004, four Michigan men were arrested and charged with obtaining and selling radios that were capable of accessing the Michigan Public Safety Communications System (MPSCS). Two civilian employees of the Michigan State Police, a town Fire Chief and a fourth man allegedly acquired illicit Motorola two-way radios, programmed them for use on the MPSCS system, and sold them. According to the charges, the Fire Chief paid for three of the radios with grant money from a fraudulent invoice.

In published reports at the time of the arrests, Michigan Attorney General Mike Cox was quoted as saying, "In today's atmosphere where homeland security is paramount, law enforcement agencies must be able to communicate without the possibility that others can eavesdrop and hear communications to which they are not privy." He went on to state, "The 800 MHz system is designed so that law enforcement and other government agencies can communicate with each other without concern lawbreakers and others can overhear those conversations. In this case, efforts were made to compromise the system. It is fortunate these efforts were stopped before any damage to the system occurred."

For anyone who has used a consumer scanner to listen to the MPSCS, the Attorney General's words are at odds with the facts. A spokesman from the Michigan State Police tried to clarify the concern by explaining that the scheme put the system at risk because the illicit radios were capable of transmitting on the MPSCS and could therefore endanger legitimate users. "We're not like the federal government," he said. "Everything we do is public information. But this stuff is happening right now and could jeopardize operations and our safety."

❖ Scanner Listener in Texas

Despite the risk of criminals being able to hear law enforcement radio transmissions, there are numerous documented incidents of scanner listeners providing critical assistance to the police. One recent incident highlights the added safety police officers gain when ordinary folks are not prevented from listen-

ing in.

In late March a Texas Department of Public Safety trooper was shot during a traffic stop in Smith County in eastern Texas. The wounded trooper managed to radio for help, describing his two attackers and their vehicle.

A citizen heard the description of the attackers on his scanner and later called the police when he spotted men matching the description at a local store. Police responded to the store and eventually arrested the men after a gunfight and vehicle pursuit.

Such assistance becomes less likely as public safety agencies move to newer, more technically complicated radio systems.

❖ Buchanan County, Missouri

Residents of Buchanan County in north-west Missouri will need to upgrade to digital scanners in order to continue to hear local police and fire activity. A new \$8.5 million trunked radio system is expected to go live this fall, replacing the old conventional analog frequencies. This upgrade may sharply reduce the number of tips that local scanner owners provide to the police, since the analog-only scanners will not be able to monitor the new system.

Buchanan County lies on the border with Kansas, just north of Kansas City, and is home to about 86,000 people. Saint Joseph is the county seat and the largest town in the county with about 74,000 residents. A Saint Joseph police spokesman was quoted in a recent article about the new radio system, "People with scanners have been more help than a hindrance to us."

It will be interesting to see if the unsolved crime rate climbs in the county after the new system comes on-line. With fewer scanner listeners able to hear police radio traffic, useful tips and leads may dry up, making law enforcement that much more difficult.

Until the new system is in the place, the county will continue to use the current VHF and UHF analog equipment on the following frequencies:

Frequency Description

151.250	County Fire (Dispatch)
154.160	County Fireground
154.755	Sheriff (Dispatch)
155.370	Sheriff Point-to-Point Intersystem
155.475	Statewide Mutual Aid
155.730	Missouri State Network
155.790	County Jail
155.985	Sheriff (Car-to-Car)
158.820	County Highway Department
158.820	County Fire Tactical
458.2875	County Emergency Management

The City of St. Joseph operates several UHF frequencies for public safety, including the following:

Frequency Description

460.150	Police (Dispatch)
460.200	Police
460.225	Police
460.600	Fire (Dispatch)
460.625	Emergency Medical Services
460.050	Fireground

The new Buchanan County 800 MHz trunked radio system is licensed for the following frequencies:

866.0875, 866.5500, 866.9500, 867.3500, 867.5375, 867.7500, 867.9500, 868.0875, 868.3875, 868.5750 and 868.8250 MHz.

Six repeater sites are licensed, with three in St. Joseph and one each in the towns of Agency, DeKalb, and Rushville.



❖ NPSPAC Interoperability

The county is also licensed to use five NPSPAC frequencies. Over the past two decades, the National Public Safety Planning Advisory Committee (NPSPAC) has put together a set of operating guidelines for public safety agencies, including recommendations for common radio frequencies to be used for mutual aid. The Federal Communications Commission (FCC) agreed with the recommendations and set aside six frequencies in the 800 MHz band for interoperability. The frequencies are:

866.0125	ICALL	National Calling Channel
866.5125	ITAC1	National Tactical Channel
867.0125	ITAC2	National Tactical Channel
867.5125	ITAC3	National Tactical Channel
868.0125	ITAC4	National Tactical Channel
868.7875	STAC5	Short-Range Tactical

In addition to these nationwide frequencies, states may have their own channels as well.

The Interoperability Call (ICALL) channel is to be used as an initial contact channel for users to reach each other in the region specifically for the purpose of requesting incident related information and assistance. The channel may also be used to set up tactical communications for specific events. In most cases, once contact has been made, the conversation will move from the calling channel to one of the tactical channels.

The Interoperability Tactical (ITAC) channels are to be used to coordinate activity between different agencies in a mutual aid situation. They may also be used on a case-by-case basis for emergency activities of a single agency if the use doesn't interfere with nearby users.

The Short-Range tactical (STAC5) channel is intended for low power communication between nearby team members, such as a dive crew or SWAT team.

According to the NPSPAC recommendations, plain language is to be used on all five interoperability channels at all times, and the use of unfamiliar terms, phrases or codes is to be kept to a minimum, unless deemed necessary for security purposes. The channels are to

be operated in conventional analog mode with a dedicated CTCSS (continuous tone-coded squelch system) setting of 156.7 Hz.

In Buchanan County, all five NPSPAC 800 MHz frequencies are licensed to a repeater on 16th Street in St. Joseph, while 867.0125 MHz (ITAC2) is broadcast from two other sites, one on Lewis School Road in DeKalb and one on Crabapple Road in Agency.

❖ VHF and UHF Interoperability

In addition to NPSPAC frequencies in the 800 MHz band, interoperability frequencies are used on the VHF and UHF bands.

155.7525	VCALL	National Calling
151.1375	VTAC1	National Tactical
154.4525	VTAC2	National Tactical
158.7375	VTAC3	National Tactical
159.4725	VTAC4	National Tactical

Also, 150.160 MHz has been recommended for National Search and Rescue (NATSAR) as a standard way for public safety agencies to work with private and volunteer search and rescue organizations.

453.2125	UCALLa	National Calling
458.2125	UCALL	National Calling (Mobile Direct)
453.4625	UTAC1a	National Tactical
458.4625	UTAC1	National Tactical (Mobile Direct)
453.7125	UTAC2a	National Tactical
458.7125	UTAC2	National Tactical (Mobile Direct)

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❖ Wisconsin

Wisconsin has a comprehensive and well-organized frequency plan that makes use of both NPSPAC and county frequencies. The following is a list of frequencies available in Wisconsin counties. In most counties all agencies will share channels, although large cities have their own local channels. Counties listed as "800 MHz" are using a trunked radio system with at least five frequencies in the 800 MHz band. Frequencies with an asterisk are also statewide mutual aid channels.

COUNTY	LAW ONE	LAW TWO	FIRE DISPATCH	FIRE LOCAL
Adams	154.755	154.755	151.325	154.415
Ashland	155.565	154.785	154.995	154.400
Barron	155.775	155.430	151.235	154.310
Bayfield	154.740	154.740	154.980	154.130*
Brown	154.740	154.890	154.370	154.130*
Buffalo	155.115	155.115	154.385	154.385
Burnett	155.670	154.7375	155.865	154.415
Calumet	155.040	N/A	154.220	156.105
Chippewa	155.415	155.070	154.430	154.250
Clark	155.250	155.805	155.955	154.370
Columbia	154.875	155.415	151.220	154.430
Crawford	155.685	155.655	154.310	154.310
Dane	155.655	154.845	158.745	154.070
Dodge	155.745	154.785	154.325	154.280*
Door	155.520	154.950	154.340	154.430
Douglas	158.730	155.490	154.370	154.220
Dunn	155.595	155.595	158.775	154.190
Eau Claire	154.875	154.950	155.880	154.220
Florence	155.580	155.580	158.820	154.220
Fond du Lac	155.625	155.970	154.355	154.070
Forest	155.730	155.730	155.895	154.190
Grant	155.865	155.490	155.745	154.340
Green	154.725	155.610	154.160	154.355
Green Lake	155.490	155.550	154.400	154.010*
Iowa	155.595	155.595	154.415	154.430
Iron	159.090	159.090	155.955	154.160
Jackson	154.815	155.685	154.445	154.445
Jefferson	154.860	155.145	154.370	154.415
Juneau	156.210	154.725	154.190	154.220
Kenosha	155.955	155.625	154.250	154.250
Kewaunee	155.190	155.670	154.310	154.145
La Crosse	155.430	155.520	154.130*	154.205
Lafayette	159.150	155.880	154.085	154.385
Langlade	154.875	155.640	155.025	154.310
Lincoln	154.800	155.640	154.980	154.400
Manitowoc	159.210	153.740	154.280*	154.010*
Marathon	159.210	155.520	154.340	154.235
Marinette	155.535	155.535	154.010*	154.355
Marquette	155.190	155.250	154.130*	154.130*
Menominee	154.815	154.785	155.040	155.040
Milwaukee (North)	800 MHz	800 MHz	154.340	154.445
Milwaukee (Central)	800 MHz	800 MHz	800 MHz	800 MHz
Milwaukee (South)	800 MHz	800 MHz	154.220	154.415
Monroe	155.625	155.085	154.235	154.400
Oconto	155.430	154.755	151.250	154.235
Oneida	154.725	155.640	154.445	154.355
Outagamie	155.700	155.820	154.250	154.385
Ozaukee	800 MHz	800 MHz	800 MHz	800 MHz
Pepin	156.210	155.730	156.210	154.175
Pierce	155.130	155.655	154.400	154.130*
Polk	155.550	154.800	154.025	154.235
Portage	155.595	155.670	154.385	154.325
Price	155.535	155.535	154.325	154.325

Racine	154.755	151.175	460.0125	458.400
Richland	154.740	154.740	155.055	154.430
Rock	159.090	158.730	155.715	154.340
Rusk	155.625	155.625	154.205	154.205
St. Croix	155.580	154.725	154.325	154.325
Sauk	155.700	155.310	151.250	154.370
Sawyer	154.860	155.685	154.235	154.235
Shawano	159.090	155.640	155.145	154.070
Sheboygan	800 MHz	800 MHz	800 MHz	800 MHz
Taylor	155.565	155.565	154.175	154.310
Trempealeau	155.775	155.775	154.070	154.250
Vernon	154.995	154.995	154.860	154.175
Vilas	155.550	155.640	154.415	154.415
Walworth	856.4375	857.4375	453.375	453.9125
Washburn	155.730	155.730	155.100	154.445
Washington	155.250	155.595	159.825	154.190
Waukesha	800 MHz	800 MHz	800 MHz	800 MHz
Waupaca	154.860	155.535	151.235	154.145
Waushara	155.130	155.865	154.055	154.010*
Winnebago	158.730	158.835	158.775	154.445
Wood	155.550	155.730	154.160	151.250

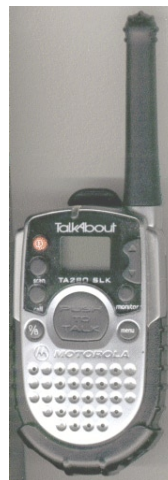
❖ Emergency Radio Networks

While public safety agencies continue to build out new radio networks, there are several efforts underway to create "grassroots" radio networks for ordinary citizens. These networks appear to have settled on commonly available two-way radios made possible by a Federal Communications Commission (FCC) rule-making process from 1996.

Ten years ago the FCC established the *Family Radio Service* (FRS) in the 460 MHz band. The idea was to make available a short range (one mile or less), unlicensed two-way radio capability for the general public. Since then a number of companies have entered the FRS market with battery-powered handheld radios that look like small walkie-talkies. Often parents use them to keep in touch with children at malls and amusement parks.

FRS Chan	Frequency
1	462.5625
2	462.5875
3	462.6125
4	462.6375
5	462.6625
6	462.6875
7	462.7125
8	467.5625
9	467.5875
10	467.6125
11	467.6375
12	467.6625
13	467.6875
14	467.7125

At the same time, the FCC also established the General Mobile Radio Service (GMRS) with 22 channels in the same 460 MHz band. GMRS was intended as a way for family members to keep in touch over short distances. Because GMRS radios are allowed to transmit with more power than FRS and may have external antennas, the FCC requires a license in order to operate them. The license costs \$80 and is good for five years. You can get the required form, number 605, on the FCC website at www.fcc.gov.



The first seven FRS channels are shared with the General Mobile Radio Service (GMRS). Some equipment manufacturers market "dual-service" radios that cover both FRS and GMRS frequencies. You are allowed to operate a dual-service radio on the shared FRS/GMRS channels without a license, but transmitting on GMRS-only channels requires a license to stay legal.

FRS Channel 1 has emerged as an unofficial calling channel that is also recommended for use in an emergency. Most emergency radio network organizations have settled on channel 1, subchannel 0 as the calling channel that people should use in a crisis.

One such local organization is DCERN, the D.C. Emergency Radio Network. DCERN uses FRS and GMRS radios to provide an alternative way of communicating during an emergency. Recent experience has shown that cellular telephones, landline telephones, and the Internet may all go down during an emergency, whether natural or man-made. By having a FRS or GMRS radio, local residents are able to keep in touch with each other and coordinate neighborhood activities.

FRS and GMRS radios were chosen for several practical reasons, including the fact that many people already own them. They are also portable, relatively inexpensive and are easy to use.

DCERN is attempting to recruit and train "Communications Specialists" who are certain to be "on the air" during an emergency. The goal is to have someone to talk to during an incident, no matter where you are in the Washington, D.C. area. More information is available on the web at www.dcradio.org.

A more geographically ambitious effort is underway with the "National SOS" public emergency network. This is an attempt to tie together FRS radio owners, GMRS license holders, amateur radio operators and scanner listeners. You can read more about it at www.nationalsos.com.

If you are part of a neighborhood organization that plans to use personal radios to keep in touch during emergencies, please write in and let me know how you're organized and how you plan to use your radios during a crisis.

That's all for this month. I welcome your comments and questions via electronic mail to danveeneman@monitoringtimes.com, and as always you can check my website at www.signal-harbor.com (or go to www.monitoringtimes.com and follow the links) for more frequencies and other radio-related information. Until next month, happy scanning!

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Frequency Coverage: 25,000-512,000 MHz., 806,000-956,000 MHz.
(excluding the cellular & UHF TV band), 1,240,000-1,300,000 MHz.

When you buy your Bearcat 796DGV TrunkTracker package deal from Communications Electronics, you get more. The GV means "Great Value." With your BC796DGV scanner purchase, you also get a **free deluxe scanner headphone** designed for home or race track use. Headset features independent volume controls and 3.5 mm gold right angle plug. The 1,000 channel Bearcat 796DGV is packed with features to track Motorola Type I/II/III Hybrid, EDACS, LTR Analog Trunk Systems and Motorola APCO 25 Phase I digital scanner including 9,600 Baud C4FM and CQPSK. Also features control channel only mode to allow you to automatically trunk many systems by simply programming the control channel, S.A.M.E. weather alert, full-frequency display and backlit controls, built-in CTCSS/DCS to assign analog and digital subaudible tone codes to a specific frequency in memory, PC Control and programming with RS232C 9 pin port (cable not supplied), Beep Alert, Record function, VFO control, menu-driven design, total channel control and much more. Our CEI package deal includes telescopic antenna, AC adapter, cigarette lighter cord, DC cord, mobile mounting bracket with screws, owner's manual, trunking frequency guide and one-year limited Uniden factory warranty. For maximum scanning enjoyment, order magnetic mount antenna part number ANTMMBNC for \$29.95. For complete details, download the owners manual from the www.usascan.com web site. For fastest delivery, order on-line at www.usascan.com.

Bearcat® BCT8 Trunk Tracker III

Manufacturer suggested list price \$299.95

CEI Special Price \$169.95

250 Channels • 5 banks • PC Programmable
Size: 7.06" Wide x 6.10" Deep x 2.44" High

Frequency Coverage: 25,000-54,000 MHz., 108,000-174,000 MHz., 400,000-512,000 MHz., 806,000-956,000 MHz., 849,0125-868,9950 MHz., 894,0125-956,000 MHz.

The Bearcat BCT8 scanner, licensed by NASCAR, is a superb preprogrammed 800 MHz trunked highway patrol system scanner. Featuring TrunkTracker III, PC Programming, 250 Channels with unique BearTracker warning system to alert you to activity on highway patrol link frequencies. Preprogrammed service searches makes finding interesting active frequencies even easier and include preprogrammed police, fire and emergency medical, news agency, weather, CB band, air band, railroad, marine band and department of transportation service searches. The BCT8 also has preprogrammed highway patrol alert frequencies by state to help you quickly find frequencies likely to be active when you are driving. The BCT8 includes AC adapter, DC power cable, cigarette lighter adapter plug, telescopic antenna, window mount antenna, owner's manual, one year limited Uniden warranty, frequency guide and free mobile mounting bracket. For maximum scanning enjoyment, also order the following optional accessories: External speaker ESP20 with mounting bracket & 10 feet of cable with plug attached \$19.95. Magnetic Mount mobile antenna ANTMMBNC for \$29.95.



Bearcat® BCD396T Trunk Tracker IV

Suggested list price \$799.95/CEI price \$519.95

APCO 25 9,600 baud compact digital ready handheld TrunkTracker IV scanner featuring Fire Tone Out Paging, Close Call and Dynamically Allocated Channel Memory (up to 6,000 channels), SAME Weather Alert, CTCSS/DCS, Alpha Tagging. Size: 2.40" Wide x 1.22" Deep x 5.35" High

Frequency Coverage:

25,000-512,000 MHz., 764,000-775,9875 MHz., 794,000-823,9875 MHz., 849,0125-868,9765 MHz., 894,0125-956,000 MHz., 1240,000 MHz - 1300,000 MHz.

The handheld BCD396T scanner was designed for National Security/Emergency Preparedness (NS/EP) and homeland security use with new features such as **Fire Tone Out Decoder**. This feature lets you set the BCD396T to alert if your selected two-tone sequential paging tones are received. Ideal for on-call firefighters, emergency response staff and for activating individual scanners used for incident management and population attack warning.

Close Call Radio Frequency Capture - Bearcat exclusive technology locks onto nearby radio transmissions, even if you haven't programmed anything into your scanner. Useful for intelligence agencies for use at events where you don't have advance notice or knowledge of the radio communications systems and assets you need to intercept. The BCD396T scanner is designed to track Motorola Type I, Type II, Hybrid, SMARTNET, PRIVACY PLUS, LTR and EDACS analog trunking systems on any band. Now, follow UHF High Band, UHF 800/900 MHz trunked public safety and public service systems just as if conventional two-way communications were used. **Dynamically Allocated Channel Memory** - The BCD396T scanner's memory is organized so that it more closely matches how radio systems actually work. Organize channels any way you want, using Uniden's exclusive dynamic memory management system. 3,000 channels are typical but **over 6,000 channels are possible** depending on the scanner features used. You can also easily determine how much memory you have used and how much memory you have left. **Preprogrammed Systems** - The BCD396T is preprogrammed with over 400 channels covering police, fire and ambulance operations in the 25 most populated counties in the United States, plus the most popular digital systems. **3 AA NiMH or Alkaline battery operation and Charger** - 3 AA battery operation - The BCD396T includes 3 premium 2,300 mAh Nickel Metal Hydride AA batteries to give you the most economical power option available. You may also operate the BCD396D using 3 AA alkaline batteries. **Unique Data Skip** - Allows your scanner to skip unwanted data transmissions and reduces unwanted birdies. **Memory Backup** - If the battery completely discharges or if power is disconnected, the frequencies programmed in the BCD396T scanner are retained in memory. **Manual Channel Access** - Go directly to any channel. **LCD Back Light** - A blue LCD light remains on when the back light key is pressed. **Autolight** - Automatically turns the blue LCD backlight on when your scanner stops on a transmission. **Battery Save** - In manual mode, the BCD396T automatically reduces its power requirements to extend the battery's charge. **Attenuator** - Reduces the signal strength to help prevent signal overload. The BCD396T also works as a conventional scanner to continuously monitor many radio conversations even though the message is switching frequencies. The BCD396T comes with AC adapter, 3 AA nickel metal hydride batteries, belt clip, flexible rubber antenna, wrist strap, SMA/BNC adapter, RS232C cable, Trunk Tracker frequency guide, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO or ESAS systems. Order on-line at www.usascan.com or call 1-800-USA-SCAN.



Bearcat® BC246T Trunk Tracker III

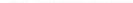
Suggested list price \$399.95/CEI price \$214.95

Compact professional handheld TrunkTracker III scanner featuring Close Call and Dynamically Allocated Channel Memory (up to 2,500 channels), SAME Weather Alert, CTCSS/DCS, Alpha Tagging. Size: 2.72" Wide x 1.26" Deep x 4.6" High

Frequency Coverage:

25,000-54,000 MHz., 108,000-174,000 MHz., 216,000-224,9800 MHz., 400,000-512,000 MHz., 806,000-823,9875 MHz., 849,0125-868,9875 MHz., 894,0125-956,000 MHz., 1240,000 MHz - 1300,000 MHz.

The handheld BC246T TrunkTracker scanner has so many features, we recommend you visit our web site at www.usascan.com and download the free owner's manual. Popular features include **Close Call Radio Frequency Capture** - Bearcat exclusive technology locks onto nearby radio transmissions, even if you haven't programmed anything into your scanner. **Dynamically Allocated Channel Memory** - Organize channels any way you want, using Uniden's exclusive dynamic memory management system. 1,600 channels are typical but **over 2,500 channels are possible** depending on the scanner features used. You can also easily determine how much memory is used. **Preprogrammed Service Search (10)** - Makes it easy to find interesting frequencies used by public safety, news media TV broadcast audio, Amateur (ham) radio, CB radio, Family Radio Service, special low power, railroad, aircraft, marine, racing and weather frequencies. **Quick Keys** - allow you to select systems and groups by pressing a single key. **Text Tagging** - Name each system, group, channel, talk group



ID, custom search range, and S.A.M.E. group using 16 characters per name. **Memory Backup** - When power is lost or disconnected, your BC246T retains the frequencies that were programmed in memory. **Unique Data Skip** - Allows the BC246T to skip over unwanted data transmissions and birdies. **Attenuator** - You can set the BC246T attenuator to reduce the input strength of strong signals by about 18 dB. **Duplicate Frequency Alert** - Alerts you if you try to enter a duplicate name or frequency already stored in the scanner. **22 Bands** - with aircraft and 800 MHz. The BC246T comes with AC adapter, 2 AA 1,800 mAh nickel metal hydride batteries, belt clip, flexible rubber antenna, wrist strap, RS232C cable, Trunk Tracker frequency guide, owner's manual and one year limited Uniden warranty. For more fun, order our optional deluxe racing headset part #HF24RS for \$29.95. Order now at www.usascan.com or call 1-800-USA-SCAN.

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Bearcat BCD396T APCO 25 Digital scanner with Fire Tone Out.....	\$519.95
Bearcat 246T up to 2,500 ch. TrunkTracker III handheld scanner.....	\$214.95
Bearcat Sportcat 230 alpha display handheld sports scanner.....	\$184.95
Bearcat 278CLT 100 channel AM/FM/SAME WX alert scanner.....	\$129.95
Bearcat 248CLT 50 channel base AM/FM/weather alert scanner.....	\$104.95
Bearcat 92XLT 200 channel handheld scanner.....	\$109.95
Bearcat 72XLT 100 channel handheld scanner.....	\$99.95
Bearcat BR330T up to 2,500 ch. TrunkTracker III with Tone out.....	\$274.95
Bearcat BCT8 250 channel information mobile scanner.....	\$169.95
Bearcat 350C 50 channel desktop/mobile scanner.....	\$104.95
AOR AR16BQ Wide Band scanner with quick charger.....	\$199.95
AOR AR3000AB Wide Band base/mobile receiver.....	\$1,079.95
AOR AR5000A+3B Wide Band 10 KHz to 3 GHz receiver.....	\$2,599.95
AOR AR8200 Mark IIIB Wide Band handheld scanner.....	\$594.95
AOR AR8600 Mark II Wide Band receiver.....	\$899.95
AOR AR-ONE Government/Export sales only 10 KHz-3 GHz.....	\$4,489.95
Scantool Gold For Windows Software.....	\$99.95
Scantool Gold For Windows Surveillance Edition.....	\$159.95

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Will the Internet Replace Utilities?

Will the net replace our favorite radio hobby? Well, no. There's really very little chance of that.

Far more likely is that the net will become another part of the way people use radios, technology will evolve and change, and we'll adapt and do new things we'd never dreamed of. We'll also keep identifying new potential threats to worry our heads.

In other words, everything will stay the same.

This whole topic of changing technology only comes up because a computer crash wiped out the really fine *Utility Logs* for this month just as they were being compiled. In the short term, I had to reconstruct a much smaller version and go back on my promise to be back to two pages this month. In the future, it means that the underlying data will get backed up far more carefully, and on another machine.

Technology always evolves much faster than the ability of people to keep up with it. Meanwhile, there's a built-in bias toward anything new. Older, working systems have been around long enough that all their limitations have been clearly documented. New, replacement systems will usually specifically address these shortcomings in an effective manner, but then cause plenty of unforeseen new ones. That's just the way it is. Today, we're certainly finding out things that the Internet will never do well.

The whole point here is that computer networking is not replacing utility radio, and it never will. It will change things, the same way the wireless changed the telephone without eliminating its use. And so let's talk about places where the two interact, with strange and wonderful effects.

❖ Numbers by Internet Phone?!?

The "numbers" situation just keeps getting stranger. As always, just when people who follow this bizarre international scene think they've heard it all, something new happens.

This latest one has got to be an all time first. It is numbers by telephone. That's right; you dial a plain old landline voice number, and get a numbers broadcast just like the ones on the radio. However, it's only by phone, and it's not even a free call.

This started in the New York City "Missed Connections" section of a huge Internet web domain called Craigslist. This free classified

ad server started 11 years ago in San Francisco, and grew explosively. It now has branches in 190 cities, doing an online volume only slightly less than such major players as MySpace.

In early May, someone posted the following rather mysterious and compelling personal ad:

For mein fraulein

Mein Fraulein, I haven't heard from you in a while. Won't you call me? 212 /// 796 /// [XXXX] ///.

[Last 4 digits edited out, in case the number gets reassigned. -Hugh]

Anyone who called this number got a short musical theme by the Norwegian pop band A-Ha, followed by a downright goofy series of numbers that were apparently sampled from real speech as opposed to machine synthesis. Different voices were used for different figures, including a weird "3" which sounded more like "P."

The initial callup was "Group 415," followed by fifty 5-figure groups, each group said twice. The end was "86," again repeated, and then the same music. The whole recording lasted about seven and a half minutes.

212 is, of course, the area code for Manhattan, and the prefix was quickly identified as one used by a large company which provides wholesale Voice-over-Internet-Protocol (VoIP) service in bulk. Basically, VoIP is a type of telephone service that replaces your connection to the phone company's wires and switches with a digital connection that goes straight to the Internet.

The merits and demerits of VoIP are hotly debated, but not important here. What is important is that anonymity can be one step closer to the ideal (which is still phase-shifting radio wave from the ionosphere). The message stayed up for about three weeks, before the account's balance apparently ran low, triggering a voice error message.

That might have been the end of it, had a similar ad not run about a week later, around the first of June. This one was on the San Francisco Craigslist, again in "Missed connections," and it went as follows:

For Mein Fraulein

Mein Fraulein, You must call me again soon. /// 415 /// 704 /// [XXXX] ///.

This time, the number was in San Francisco. It was still VoIP. Callers got the same music and goofy "voice," with a callup to "Group 617." This time there were 40 repeated 5-figure groups, then a signoff of "7," and the music again.

By now, both the radio "numbers" community and the computer-geek cultures were all over this one. It had become the latest worldwide Internet mystery. The number must have done an incredible volume, because this time the account balance ran out in days instead of weeks.

The parallel between the first callup of "Group 415," and the next phone number being in the 415 area caused perhaps thousands of people to start looking for the 617 area code, which is metro Boston. Sure enough, a similar ad appeared almost immediately on the Boston Craigslist. It turned out to be a hoax. Callers got a voice menu promising directions to branches of the Federal Reserve Bank.

The hoax doesn't mean much. At press time, there's a lot of June left, and if the mystery runs true to pattern, the next ad would run around July 1.

Meanwhile, everyone's left to speculate on one aspect of the messages guaranteed to raise the interest of cryptography people. This is the appearance of "0" as every third figure in the coded groups.

A full explanation of why this is so astonishing would require another column. We'll have to note that the encryption system used by most numbers stations uses the most random sequences available, and should produce random output lacking handles into analysis and breaking of the code. The absence of such randomness here has many people attacking the encryption. Will they decode it? Is this what the perpetrator wants — an intellectual exercise for "numbers" fans? Or is it really a true intelligence drop?

By now, some readers might be asking, "All this is weird, all right, but what's it got to do with radio?" A good question deserves a good answer, and here it is: The goofy voices and general structure are very similar to a radio numbers broadcast which was widely monitored sometime in 2005. At the time, it was all too weird to take seriously, and it never appeared again. It was written off as another of those fake numbers pirates that appear every so often.

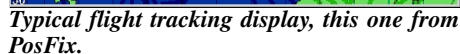
Was it? And did it just move to the phone? Stay connected...

❖ Will HF DL Go Encrypted?

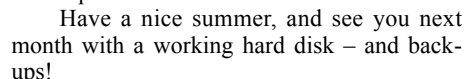
HF DL stands for High-Frequency Data Link, a radio system proprietary to Aeronautical Radio, Incorporated (ARINC), using a standard known as ARINC 635-3. It uses a very extensive and well-thought-out network of 14 intercon-



VHF ACARS decoders have been around forever, but HFDL was first opened up by the talented Charles Brain, a UK ham who knows everything. His PC-HFDL was and is a very nice little application that just sits there and works.



Navtex stands for Navigational Telex. Many are already aware that it is an adaptation of the older SITOR-B mode that transmits automated broadcasts of weather and safety notices to ships. Most newer computer software packages do a nice job on SITOR-B, which is always 170 Hertz shift and 100 baud speed. The primary



ID	CALL	STATION	AREA
A	NMA	USCG, Miami, FL	IV
C	NMC	USCG, Pt. Reyes, CA	XII
D	VAJ	Canadian CG, Prince Rupert, BC	XII
G	NMG	USCG, New Orleans, LA	IV
H	XLK 835	Canadian CG, Tofino, BC	XII
J	NOJ	USCG, Kodiak, AK	XII
O	NMO	USCG, Honolulu, HI	XII
Q	NMQ	USCG, Cambria, CA	XII
R	NMR	USCG, San Juan, PR	IV
W	NMW	USCG, Astoria, OR	XII
X	NOJ	USCG, Kodiak, AK	XII

ABBREVIATIONS USED IN THIS COLUMN

AFB.....	Air Force Base
ALE.....	Automatic Link Establishment
ARQ.....	Automatic Repeat Request
AWACS.....	Airborne Warning and Control System
CAMSLANT.....	Communication Area Master Station, Atlantic
CAMSPAC.....	Communication Area Master Station, Pacific
CW.....	"Continuous Wave" Morse telegraphy
EAM.....	Emergency Action Message
FAX.....	Radiofacsimile
FEC.....	Forward Error Correction
FEMA.....	US Federal Emergency Management Agency
HFDL.....	High-Frequency Data Link
HF-GCS.....	High-Frequency Global Communication System
M21.....	Russian air defense; ? is missing figure, T=0
MARS.....	Military Affiliate Radio System
Meteo.....	Meteorological
Navtex.....	Navigational Telex
RSA.....	Republic of South Africa
RTTY.....	Radio Teletype
SITOR-A.....	Simplex Telex Over Radio, ARQ mode
SITOR-B.....	Simplex Telex Over Radio, FEC mode
US.....	United States
USCG.....	United States Coast Guard
UK.....	United Kingdom

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time). "Numbers" stations have their ENIGMA (European Numbers Information Gathering and Monitoring Association) designators in ().

- 68.0 GYD20-UK Submarine Communications (UKSUBCAMS), Northwood, with three test messages to "All Submarines," also welcoming Swedish subs *Sonderland* and *Sodermanland*, in RTTY (50/75 reversed), at 2100. (Patrice Privat-France)
- 230.0 AQE-Allwood nondirectional aero beacon, Green Belt, NC, CW at 0434. (Eric H. Christensen-NC)
- 336.0 MCZ-Williamston nondirectional aero beacon, NC, CW at 0429. (Christensen-NC)
- 518.0 "C"-Cape Town Radio (ZSC), SITOR-B Navtex at 1645. (Bob Hall-RSA)
- 3321.0 ZS-SFN-South African Airways flight 616, an Airbus A319, working Johannesburg in HFDL, at 1220. (Hall-RSA)
- 4014.0 ZSC-Cape Town Radio, RTTY weather at 1715. (Hall-RSA)
- 4336.5 VTH4/5-Indian Navy, Mumbai, RTTY test loop at 1610. (Hall-RSA)
- 4469.0 Southeast CAP 43-US Civil Air Patrol, opening net with Goldenrod 16, Florida CAP 209, and others, at 0001. (Mark Cleary-SC)
- 4991.0 NK1-US Federal Bureau of Investigation, Newark, NJ, calling QT1, Quantico, VA, ALE at 0902. (Cleary-SC)
- 5643.0 Qantas 134-Australian flight, position for Brisbane, came from 8867, at 0525. (Privat-France)
- 5696.0 Coast Guard 2105-USCG helicopter, setting radio guard with CAMSLANT at 2220. (Cleary-SC)
- 5732.0 Juliet 16-USCG helicopter, position for CAMSLANT at 0111. (Cleary-SC)
- 6323.5 NMC-USCG CAMSPAC Point Reyes, CW identifier in SITOR-A phasing bursts, at 0421. (Christensen-NC)
- 6694.0 Tusker 313-Canadian Forces CC-130, patch via Halifax Military, NS, to Wing Ops at 0239. (Cleary-SC)
- 6985.0 T12-US Army 12th Aviation Brigade, calling R26141, ALE at 1458. (Cleary-SC)
- 7508.0 ZSC-Cape Town Radio, RTTY weather, parallel 13538 and 18238, at 0930. ZSC, FAX surface chart, parallel 13538, at 1105. (Hall-RSA)
- 7527.0 J14-USCG helicopter, raising LNT in ALE, then voice ops-normal to CAMSLANT as Juliet 14, at 0113. (Cleary-SC)
- 7650.0 R26125-Ohio National Guard helicopter, calling T1Z137 (1-137th Aviation, OH), ALE at 1603. (Cleary-SC)
- 8171.5 R23547-Indiana National Guard helicopter, calling T2Z238 (2-238th Aviation, IN), ALE at 1329. (Cleary-SC)
- 8292.0 9MR-Malaysian Navy, RTTY test loop at 1731. (Hall-RSA)
- 8421.5 LZW-Varna Radio, Bulgaria, CW identifier in SITOR-A bursts, at 0209. (Jim Pogue-TN)
- 8461.7 9MR-Malaysian Navy, RTTY weather and coded message in 5-

- letter groups, at 1635. (Hall-RSA)
- 8831.0 Delta 64-Delta Airlines flight, calling New York in voice on the HFDL frequency, predictably no joy, time unknown. (Glenn Blum-TX)
- 8971.0 Fiddle-US Navy, working P-3C Red Talon 711, at 1341. (Cleary-SC)
- 8983.0 CAMSLANT Chesapeake-USCG, VA, getting position of Coast Guard 2139, at 1904. (Allan Stern-FL)
- 8983.0 Rescue 2127-USCG helicopter on a search, setting radio guard with CAMSLANT, at 0011. (Cleary-SC)
- 9220.0 Unid-Russian Air Defense, formatted and time stamped CW tracking observations (M21), at 0945. (Mike L.-W. Sussex, UK)
- 10493.0 Lions Den-FEMA, Maynard, MA, also using callsign WGY 911, working Big Casino, Red Light, Hang Dog, and Cordon Bleu, at 1900. (Jack Metcalfe-KY)
- 10535.0 CFH-Canadian Forces, Halifax, NS, RTTY weather at 0645. (Hall-RSA)
- 10555.0 VMW-Australian Bureau of Meteorology, Wiluna, FAX surface chart at 1120. (Hall-RSA)
- 11000.0 RIW-Russian Navy, Moscow, working RHV42, also listening on 8326, CW at 1120. (Mike L.-UK)
- 11046.0 CX6U-Unknown station, working YOSP, at 1605. (Metcalfe-KY)
- 11090.0 KVM70-Honolulu Meteo, FAX chart at 0745. (Hall-RSA)
- 11175.0 Andrews-US Air Force, MD, announcing watch on 4724, 6739, 8992, 11175, 13200, and 15016 kHz, all HF-GCS channels, at 0200. (Christensen-NC) Offutt-US Air Force HF-GCS, NE, all-frequency call for tanker Petro 41, no joy at 1725. Petro 41, working Puerto Rico HF-GCS, went to 15025 for a patch regarding status of Petro 42, at 1757. (Stern-FL)
- 11205.0 Shark 13-US Joint Task Force, ops-normal for Smasher, CA, at 1918. (Cleary-SC)
- 11232.0 Goliath Alpha-US Air Force E-3 AWACS, patch via Trenton Military, ONT, went to 7831 at 1412. (Cleary-SC) Rescue 310-Probable Canadian Forces CC-130E on a search, patch to Rescue Coordination Centre via Trenton, at 0220. (Pogue-TN)
- 12579.0 NRV-USCG Guam, SITOR-B weather and maritime information at 0800. (Hall-RSA)
- 12594.5 A9M-Hamala Radio, Bahrain, CW identifier in SITOR-A phasing bursts, at 2353. (Pogue-TN)
- 12603.5 SVO-Olympia Radio, Greece, CW in SITOR-A bursts, at 1658. (Hall-RSA)
- 12606.0 UIW-Kaliningrad Radio, Russia, CW in SITOR-A bursts, at 2002. (Pogue-TN)
- 13200.0 Andrews-US Air Force HF-GCS control point, with a 48-character EAM at 1916. (Jeff Haverlah-TX)
- 13321.0 ZS-SFK-South African Airways flight 41, an Airbus 319, working Johannesburg in HFDL at 1037. (Hall-RSA)
- 13538.5 ZSC-Cape Town Radio, FAX surface chart at 1135. (Hall-RSA)
- 13927.1 AFA1EN-US Air Force MARS, IN, patching King 77 to Patrick AFB, FL, at 0038. AFA1WP-US Air Force MARS, OH, patching JOSA 133, a Distinguished Visitor flight, to Andrews, then to Scott AFB, IL, at 1414. (Stern-FL)
- 14396.5 NCS 216-US National Communications System, on a hurricane demonstration at Homestead AFB, FL, working KSZ88 (Boston Regional Manager, MA), and also using 7632, at 1630. (Metcalfe-KY)
- 14965.0 RFFA-French Ministry of Defense, Paris, ARQ traffic at 1700. (Hall-RSA)
- 15016.0 Andrews-US Air Force HF-GCS, MD, 6-character exercise EAM "for Zulu Force," at 1704. (Haverlah-TX)
- 16806.5 NMC-USCG CAMSPAC Pt Reyes, SITOR-B maritime information at 0920. (Hall-RSA)
- 16812.0 A9M-Hamala Radio, Bahrain, CW in SITOR-A bursts, at 1655. (Hall-RSA)
- 16922.0 VTH5-Indian Navy, Mumbai, RTTY test loop at 0700. (Hall-RSA)
- 16971.5 JJC-Tokyo Radio, Japan, Kyodo newspaper FAX (60/576), at 1115. (Hall-RSA)
- 17146.0 CBV-Playa Ancha Radio, Chile, FAX surface analysis at 1715. (Hall-RSA)
- 17147.0 URL-Sevastopol Radio, Ukraine, RTTY traffic for RKTS, vessel *Konstruktor Koshin*, at 1534. (Hall-RSA)
- 17441.5 5YE-Nairobi Meteo, Kenya, RTTY weather codes at 0710. (Hall-RSA)
- 18060.0 VMW-Wiluna Meteo, Australia, FAX Pacific chart at 0751. (Hall-RSA)
- 18296.5 RFQPM-French Forces, Djibouti, coded ARQ message to RFVI, Le Port, at 0630. (Hall-RSA)

Digital Country Profile: Denmark

Before we dive in on Denmark, here are some quick updates on a few other topics.

Regarding the Algerian digital profile published back in the May issue, it seems like the Algerian Navy are active with standard MIL-188-141A ALE after all.

Prompted by a report from Leif Dehio, a number of UDXF listeners reported light frigate *Rais Korfu* operating with identifier "RS903A" working the Naval base at Oran "ORAN2A." Frequencies noted are 3059, 4201, 6925, 6966, 7793 and 13200 kHz. Doubtless there are more frequencies that have yet to be discovered.

If other boats in this class are similarly equipped, the expected other identifiers would begin "RS901" and "RS902." All remaining vessels also carry three figure identifiers.

❖ The XSS ALE Mystery Net

Since around May 2005, most European monitors have logged many frequencies of a new network of undetermined origin led by station "XSS." XSS occasionally trades link checks with other members of the network, XAX, XCA, XFU, XFY, and XGH.

The pool of frequencies is quite extensive running from 2 to 22 MHz, suggestive of world-wide operation:

2199 2217.4 3161 3227.4 4166.3 4226.5
6243 6425 8126.4 10160 10360 10458
12057.5 12333 14510 20300 and 20965
kHz USB

ITU Monitoring documents peg the location of XSS in the UK, which seems to tie in with some suggestions of transmissions from British listeners.

Who's the user involved? No one seems quite sure. There definitely seems to be a relationship with the "Axx" network which had a similarly large frequency pool to choose from, so perhaps British Military or Diplomatic communications have returned to HF again?

❖ Denmark's Digital HF Users

Like most Western European countries, Denmark is another example of a once heavy user of HF circuits that has since scaled back.

Danish Diplomatic Service

A few years ago, one could catch MFA Copenhagen and its embassies on just about any day. The distinctive Danish Thrane & Thrane 4-tone "double SITOR-A" system called TWINPLEX ran the show with a notable .9kHz offset. Despite having departed to satellite and Internet-based links, OZU25 does return to the

air sporadically to test back-up equipment. It is a rare and welcome catch for many monitors.

Here is OZU25's frequency pool, these channels having stayed largely intact through the years:

7467.9 7468.9 11327.9 11341.9 11419.9
11437.9 13211.9 13274.0 13457.9 13486.9
16209.9 16284.9 16406.9 18513.9 18576.9
18583.9 19108.9 and 19230.9 kHz

Links are triggered via the usual SITOR-A selcalling mechanism, with TPxx series selcalls being used.

Danish Air Force

Aside from the home territory and the Faroe Islands, the Royal Danish Air Force has some of the world's largest and harshest territory to cover, namely the island of Greenland. The headquarters is based at Karup Airbase and the Air Materiel Command is based at Vaerloese. Other smaller airbases exist at Aalborg, Vandel and Skrydstrup.

All these locations can be heard through an active MIL-188-141A based ALE network which operates on the following frequencies:

2250 2296 2531 3023 3053 3291 4577
4840 4841 5120 6630 6651 6721 6730
9035 11076 11217 11224 11468 12186
13435 13455 15042 15820 16280 and
16327 kHz USB

OWB.....Karup Rescue
OWC.....UNID
OWD.....Vaerloese
OWE.....Karup
OWF.....Skrydstrup
OWG.....Vandel
OWI.....Aalborg
OWJ.....Tirstrup
OWK, L.....HQ Vedbaek

The Greenland operations can be heard via STANORD (Station Nord) and PRIMROSE (Karup Airbase), OYG (Mestersvgy, Greenland) and FOTAB (Danish Contingent at Thule USAF station), which have all been heard on 6730, 9035 and 11217 kHz.

Danish Army

The Royal Danish Army, in addition to its home defense duties, is also active in a number of UN and other operations including a small contingent in Iraq.

The two digit ALE calls and that of headquarters station DK11 can be heard on a wide variety of frequencies.

Identifiers:

20, 21, 23, 29, 30, 45, 50, 52, 60, 65, 68,

69, 71, 79, 81, DK11 and D31

Frequencies:

5058 5788 6712 7865 8010 9260 10566
11003 11130 12216 16077 18230
18556U 19885U 20062 20450 22916U
23532 and 24065 kHz

ALE has been heard triggering PacTOR, MIL-188-110A high speed modem and DART messaging terminal. Operator chatter via AMD messages over ALE has also been heard.

Contingents operating in Bosnia-Herzegovina have been heard on 8066 USB using various 3-letter Lxx callsigns.

Danish Navy

Despite a fairly large ocean-going and inshore fleet, the Danish Navy features little in HF use. Of those that have been heard:

OUA, the Naval headquarters at Aarhus, has used the low frequency channels of 122.3, 129.8, 141.4 kHz in addition to sending CW on 2357.5kHz.

OVC, the station at Groennedal on Greenland sends on 2400, 4637 and 18281 kHz.

Weather

The Danish Meteorological Institute's Copenhagen (or, more accurately, Skamlebaek) Meteo transmits weather fax pictures using callsign OXT on 5850, 9360, 13855 and 17510 kHz. All transmissions are with 120lpm 576IOC and 800Hz shift.

Coast Stations

With more than 7,000km of coast line and over 400 islands in Denmark alone, you can imagine the need for a few coast stations to keep the many vessels that pass through its waters safe. The major station serving the main parts of the country is OXZ, Lyngby Radio, on:

1613 1704 2586 8427 8598 13083
13116 16815.5 16821.5 17068.4 and
22385 kHz

There are also further stations, OXB (Blaavand Radio) on 1734 kHz and OXJ (Torshavn, Faroe Islands) on 2069 kHz.

That's about it for this country. As ever, your suggestions and questions via email or snail mail are welcome. Happy digital DXing.

RESOURCES:

Danish Met Institute - www.dmi.dk/dmi/index/viden/sendeplan.htm
Danish Forces - forsvaret.dk/fko/

Push for DRM on 26 MHz

Benn Kobb writes: At the National Association of Shortwave Broadcasters conference, near Washington, D.C., I was intrigued by discussions about the use of the 26 MHz band for non-skywave, local and regional broadcasting in DRM.

Thomson Broadcast and Multimedia, the latest incarnation of the venerable transmitter manufacturer, has an article about this in the Spring 2006 issue of their *Radio News* promotional publication, which was distributed at the conference. Propagation of this system is apparently comparable to VHF, provided that the antenna is designed to minimize radiation into the sky. Depending on topography, the company said, a 26 MHz digital transmitter can cover 3000 to 10000 square kilometers with only 10 kW of transmission power.

Ulis Fleming reported in detail on this and other DRM developments via his illustrated website <http://www.radiointel.com/drm2006.htm>

In his *Panorama* column, Célio Romais in Brazil reported that according to info from Rádio Senado, due to equipment holdups in customs, Radiobrás had not yet begun DRM tests on AM and FM, but tests on 25885 with 600 watts from the faculty of technology at the University of Brasília had begun in May.

VT Communications reported they were testing two discrete services over a single 20 kHz band centered at 25700 from Crystal Palace for Greater London – one carrying DW and the other, UBC Classic Gold.

The object of DRM on 26 MHz is to occupy a vacant band and avoid ionospheric propagation, but that just poses an intriguing challenge for DRM DX listeners, especially now at solar cycle minimum. See below for surprising reports of the low-power (FM) KOA link on 25,950 heard as far away as Paraguay.

And in Italy, DRM DXer Andrea Borgnino, IW0HK, reported in *bclnews.it* that he was getting WRN's London transmission on 26000 as well as TDF-1 in Paris, 400 watts on 25765, all day long thanks to sporadic E, although usually with weak signals and poor readability.

Welcome to the 12th National Mexican DX Meeting

The DX clubs of Mexico are pleased to welcome DXers from all over Mexico, the United States, and worldwide to the 12th National DX Meeting "Ascensión 2006," which will take place July 28, 29 and 30 in the city of Ascensión, state of Chihuahua, not far from the border:

<http://groups.yahoo.com/group/AM-SW-DXing/message/789>

AUSTRALIA VL8T, Tennant Creek, excellent on 2325 kHz at 1319, call-in show; // 2485 VL8K Katherine with characteristic buzz, but 2310 VL8A Alice Springs not on (Walt Salmaniw, Queen Charlotte Islands BC, WORLD OF RADIO) VL8A, 4835 & 2310, went off the air mid-May for three months of refurbishing, according to Nigel Holmes of RA (Chris Hambly, DX LISTENING DIGEST) Will there be another HF relay via RA Shepparton to fill in? (gh)

ABC from Darwin & Alice heard on 6080 at 1019-1113. Website says 6080 evening, 11880 days, no exact times. Katherine also turned off at end of May for extended period. Also got reply from ABC saying Alice would be off until early August, and also Katherine until late Sept. So only Tennant Creek, already refurbished, 2325 and 4910 remain on from the NT (Dave Valko, PA, HCDX)

RA itself still uses 11880 at night, such as at 1800 (Phil Atchley, CA, swl at qth.net) 6080 with NT service at 1231 overriding Singapore English service; RA used to wait until 1400 to open 6080 when RSI was finished (gh) RA was a long standing user of 6080 to PNG/Indonesia at 0900-1400 and gave up the channel a few years back when Singapore started using it over RA. Our present usage is temporary for the duration of transmitter repairs and performance is adequate into the NT. If we need to extend the support transmission, I will consider an alternate frequency; I'm looking around now (Nigel Holmes, RA, DXLD) Serves 'em right, then.

I'm back from commissioning two new transmitters for RA at our Brandon station in Far North Queensland (about 70 km south of Townsville). Still running at 10 kW, but 20 kW rated so should be reliable – and they can do DRM, so I will think about some limited DRM test transmissions later this year. "Coral Sea" service on 12080, 80 degrees at 2000-1200 (Nigel Holmes, RA, to monitor George Poppin, DXLD) And rest of day on 9660 (gh)

BELARUS Hearing R. Belarus to NAM regularly, English at 0200-0230, strongest on 5970 but heavy adjacent QRM, only a carrier on 6170, 7210, weaker than 5970 but no adjacent QRM makes it best. Suspect not running full power of 100 or 250 kW (J. D. Stephens, AL, DXLD) This is daily except UT Thu & Sun; and Sun at 0230 instead. English programs include *Belarus Today* on Tue & Fri; *Cultural Variety* on Sat; *Legacy* on Mon; *Events* on Wed (R. Belarus website via Alan Roe, World DX Club Contact)

Radio station Belarus is carrying out an audience survey to better understand needs and preferences of listeners. Results will be used to improve our schedule in the new season (Ruslan Prohorov, Deputy Director, prohorov@all.tvr.by via Jim Pogue, HCDX) Maybe he will send you a survey on request. For start-

ers, needs to be audible in NAM without strain (gh) 11930 from *0357, Home Service First Program, nice reception, S7, local news and weather (Walt Salmaniw, BC, DXLD)

BHUTAN Thomson has been awarded contract for a new 100 kW DRM-ready SW transmitter, model TSW 2100D, associated equipment, and a new Quadrant antenna, HQ 1/0.3 for 5/6 MHz. BBS will broadcast on 5035, 6035 and 7500 kHz. The old 1988 50 kW Thomson is still in use at the same transmitter site, Sangaygang, 2600m ASL near Thimpu. To be on the air at the beginning of 2007 (Thomson Radio News via Wolfgang Büschel) 7500 would be new and we hope, a bit more DXable (gh)

BOLIVIA unID on 6165 closes around 2320, sometimes in the middle of a tune. May be the Bolivian (Kenneth Olofsson, Sweden, SW Bulletin) That could be R. Logos during a window of opportunity this season, as RN does not open until 0000 and Chad and Croatia should be off by 2300 (gh)

BRAZIL ZYF-204, Súper Rádio Alvorada, Rio Branco, on 2460 at 0935 with religious music; 0954 mentions it relays R. Tupi, in Acre (Héctor Álvaro Gutiérrez, Perú, Conexión Digital)

BULGARIA R. Bulgaria, 2300 in English to NAM on 11700 was blocked from March 26 until June 5 by HCJB in Spanish which was apparently using this frequency by mistake until we brought it to their attention and they moved back to 11720 (gh)

CANADA On occasion, the R. Sweden relay at 1300 in Swedish, 1330 in English on 15240 has been marred or replaced by DRM noise. On May 15 the DRM was audible from 15160 to 15300 (gh) The transmitter that broadcasts the analog Radio Sweden program is also our DRM transmitter. We have been running tests to determine if the transmitter is faulty, or is somehow simultaneously transmitting digital and analog. Thank-you for your feedback, Glenn, and let us know if there are any more anomalies (RCI Sackville MasterControl)

CHINA [non] New clandestine to China, Voice of Reborn, M-F 0300-0310 UT 9660 kHz, 1400-1410 9780, has a web site <http://www.vocr.org> with mp3 on-demand; began Nov 11, 2005. Address is china@vocr.org (Takahito Akabayashi, Japan, BC-DX) Previously rendered as Voice of China Reborn (gh) via Kouhu, Taiwan, site, 100 kW, 267 degrees (Wolfgang Büschel, *ibid.*) SW audience here: see USA

COLOMBIA Radio Lider reactivated 6139.8 for a few nights around Mother's Day, heard May 14 at 0950-1011 (Ron Howard, CA, DXLD) On 6139.79 at 0045-0110+ romantic Spanish ballads. Returned again May 29 at 0600-0630+ (Brian Alexander, PA, *ibid.*)

Weak leapfrogging spurs on 5809.65 and 6110.43, 0615-0630+ – 5809.65 with La Voz de tu Conciencia spur from 6010.17; 6110.43 with Marfil Estéreo spur from 5909.91; at 100.26 kHz intervals (Brian Alexander, PA, DXLD) First report I've seen of the 6110+, blocked earlier by NHK,

All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; A-06=summer season; [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated

etc. There might be a het audible then, however (gh)

CUBA Three new omni-directional antennas have been installed for use on 5, 6, 9 and 11 MHz. These are in operation on 5025 24 hours with 50 kW R. Rebelde; and for RHC 100 kW at 2130-0500 on 5965, 1100-1500 and 0000-0700 on 11760. We are also upgrading our studio-transmitter links to fiber optics and digital (Arnie Coro, DXLD)

DIEGO GARCIA On two consecutive days, AFN made the switch from 12579 to 4319 within half a minute of 1453. 12579 quite distorted with usual slow CW QRM, 4319 very weak. Never a hint of an ID or anything local; // 5765 Guam, 10320 Hawaii (Walt Salmani, BC, WORLD OF RADIO)

ECUADOR HCJB does still broadcast in English! It's a special language learning show at 2345-2400 in the Spanish service on 11720 (Moisés Knochen, Uruguay, DXLD) see BULGARIA

[and non] Although other English broadcasts were terminated, DX Partyline continues via Australia, WWCW, WRMI, but from June reduced to 15 minutes (Allen Graham, HCJB) At same time its Spanish equivalent, *Aventura Dixista*, expanded from 5 or 7 minutes to 15, Sundays at 2240 on 6050, 12000 and 21455, and is also carried by WRMI, paired with DXPL at the same times as before (*Programas DX* and José Elias Díaz Gómez, Venezuela, WORLD OF RADIO) 25% of the new "condensed" DXPL is still devoted to "Tips for Real Living," while Spanish listeners are spared such off-topic evangelism (gh)

ETHIOPIA [non] Clients of TDP via Armavir, Russia, 250 kW, 188 degrees, changed from 12130 to 11830: Voice of Delina in Tigrigna, 1700-1730 M-F, ex 1800-1900; and Radio Horyaal in Somali, 1730-1800 Sat-Thu (DX Mix News, Bulgaria)

FINLAND YLE will close all SW from Pori, according to reports in Finnish (AnlaShok, DXLD) YLE says that R Finland will cease SW and MW transmissions from Pori in 2007 (Alpo Heinonen, Finland, *ibid.*) Will the SW transmitters be closed or used by someone else? (Kai Ludwig, Germany) People think R. Finland doesn't respond, but they are sending to wrong addresses! Send reports to correct address: Digita Oy, Porin lyhytaaltokeskus, Makholmantie 79, FI-28660 Pori, Finlandn or raimo.makela@yle.fi (AnlaShok, *ibid.*)

GHANA GBC, Accra, 4915, *0529-0533, sign-on with rooster crowing, drum IS, then choral NA. Sign-on announcement, schedule. Religious choral singing. 0529 Ghana pledge of allegiance, drum IS again, 3+1 time ticks, 6 o'clock [sic] timecheck, news. Fair strength but a lot of congestion by two Brazilians, much clearer from 0533 when Anhanguera went off, leaving Macapá (Dave Valko, PA, DSWCI DX Window) Also at 2317-2336+, in English, reggae, fadey but mainly on top (Harold Frogde, MI, MARE Tipsheet)

GREECE Updated A-06 of ERA-5 Voice of Greece in Greek from May 11 [when Kavala/IBB cooperation ceased]: 1900-0555 7475, 1100-1000 9420, 0500-1000 12120, 0600-1000 & 1100-1855 15630. Radio Filia multilingual Interprogramme including English at 1830 on 7430: cancelled! ERA-3 Radiofonikos Stathmos Makedonias in Greek: 1100-1655 9935, 1700-2255 7450 (DX Mix News, Bulgaria)

ICELAND On June 2 at 0705, the AFRTS USB relays on 7590 and 9380 were missing (Luca Botto Fiora, Italy, *playdx.yg*) Is this coincidental, permanent? The day before, the Keflavik MW AFN station Thunder 1530 closed down permanently as US forces are withdrawing (gh)

INDIA Am hearing a new Indian regional station, on 3365 at 1750 June 1; not in PWBR (Chris Hambly, Victoria, DXLD) Ha! Nor in WRTH 2006, but they both jumped the gun in eliminating this old 90m outlet from Delhi which was supposed to have moved to 60m months ago, along with three others (Glenn Hauser, *ibid.*)

INDONESIA RRI-Wamena has reactivated again on 4869.9. In Japan, first noted 14 May with very good signal, but QRM by RRI-Sorong on 4870.9 (Kenji Takasaki in Mie pref, HCDX) 4869.94, RRI Wamena (presumed), 1200-1300, joined Jakarta program in progress at 1201:40-1225 (John Wilkins, CO, DSWCI DX Window) 4870.9, RRI Sorong (presumed), 1130-1201, best on USB, to get away from 4869.94, which I assume was Wamena (Ron Howard, CA, DXLD) Another day, Sorong 4870.09 went off at 1145*. Sorong and Wamena were hating against each other, solved by using USB and LSB. Although both have been somewhat irregular, especially Wamena, they have both been very stable on their respective frequencies for several years (John Wilkins, CO, BCDX)

On 7289.88, RRI Serui, (Irian Jaya). In Indonesian, ID as RRI, then news relay from Jakarta. Volcano update, 0800 sports, 0815 soccer scores, past 0820 WRTVH sign-off (John Wright, NSW, Australian DX News) 7290, RRI Nabire. Fair at times, but very noisy, with Indo talk at 0802-0805 same date (Dennis Allen, *ibid.*) Serui or Nabire? Needs a studio ID here (Craig Seager, ADXN ed.) EIBI, PWBR and ILG say Nabire; WRTH and Aoki say Serui (gh) DSWCI DBS 8th Edition gives 7289.9 to RRI Nabire, last logged Feb 06. No mention of Serui which has been deleted (Ken Baird, NZ, DXLD)

LAOS [non] Moj Them Radio is new service brokered by VT Communications, Wed & Fri in Hmong to Laos at 0200-0230 via 15260 Taiwan, 100 kW, 250 degrees (DX Mix News, Bulgaria)

Something new, immediately following twice-weekly Hmong Lao Radio on same facility at 0100; also added to TDP schedule linking to <http://www.mojthem.com/> Appears this group was involved with Air America, the wartime CIA transport service, and is also based in "Hminnesota." Beware: music launches automatically. Also has mp3 of many past shows; address: HMOOB MOJ THEM, P. O. Box 75666, Saint Paul, MN 55175-0666. E-mail: info@mojthem.com So what does "Moj Them"

mean? (gh) It is via Bau Jong, Taiwan site (Wolfgang Büschel, BC-DX) Both heard on UT Wed, with a one-minute transmitter break at 0159; singing, then non-stop talking, not heard after 0230 (Ron Howard, China, DXLD) Some other reports had Moj Them presumed, running past 0230, and not only on Wed & Fri (gh)

Hmong Lao Radio via WHRI, Sat & Sun 13-14 moved from 11785 to 11940 (DX-Mix News, Bulgaria)

LATVIA According to Tony Currie of Radio Six International, Scotland, in his *Radio News Bulletin* for June, "the shortwave transmitter at Ulbroka, Latvia, is undergoing a major overhaul this summer and so 9290 kHz will be off the air from June 3rd until early September." (Bryan Clark, New Zealand, DXLD)

PAPUA NEW GUINEA R. Northern, 3345, 0917-1010, in Pidgin clearly mentioning the National Broadcasting Corporation; reggae, PSAs, 0928 and 0932 IDs. Gradually fading, static QRN, but best signal yet from this reactivation (Dave Valko, PA, DSWCI DX Window)

PERU I am frequency director of R. La Hora, Cusco, on 4855. Management headed by Edmundo Montesinos has for economic reasons decided to reduce airtime on SW to 10-14 and 23-24 UT M-F. We are issuing a new pennant (Carlos Gamarra, adalidcusco@hotmail.com via José Miguel Romero, Spain, DXLD) Carlos Gamarra Moscoso hosts a sports show on 4855.6; he tells me the SW schedule is from 1000 M-F, and after a break resumes at 2000-0100; best heard here around 2230-2300 (Arnaldo Slaen, Argentina, *ConDig Ultimas Noticias*)

R. Tawantinsuyo, Cuzco, 6173.8, 0005-0040, M&W in Spanish, brief segments in Quechua, music, ID, Mother's Day greetings. Weak to very weak, then from 0042 on 6193.4 heard probably R. Cuzco, very weak with adjacent QRM (Manuel Méndez, Spain, DXLD) R. Cuzco, 6193.42, 0205-0214* with folk music, Spanish announcements, 0213 ID, abrupt sign-off. Fair with very little adjacent channel splatter (Brian Alexander, PA, DXLD)

On 4790.31, Radio Visión, Chiclayo, Lambayeque, 0915-0945, weak with huaynos, Spanish (Chuck Bolland, FL, DXLD) 4790.292 between 0900 and 1043 (Bob Wilkner, FL, *Japan Premium*) Heard at 0300 as always with recordings from the Iglesia Pentecostal La Cosecha, new owners of the station, formerly R. Imperio on 4385. DX contacts via <http://www.iplacosecha.org/sugerenciasadd.php> and in the message indicate: Atención Sr. Jorge Tesen (Alfredo Cañote, Perú, DXLD) Or Radio Visión, Jirón Juan Fanning 457, Urbanización San Juan, Chiclayo, Perú (Roberto Pavanello via Dario Monferini, *blcnews.it*) 4790.26, clear ID at 0931 before program *La Voz de Salvación* (Dave Valko, PA, HCDX) So no longer R. Atlántida, Iquitos, on 4790 (gh)

PHILIPPINES R. Pilipinas, English from *0200 on new 15510, but announcing only 12025, 15120 and 15270 (Ron Killick, NZ, HCDX) 0200-0330 via Tinang 250 kW on 11885 and 15270 283 degrees, 15510 315 degrees (Wolfgang Büschel, *ibid.*) So now only one of the frequencies announced is correct! Too close to R. Australia 15515 (gh) Poor from *0200 news but LSB pulls out usable audio (Scott R. Barbour, Jr., NH, DXLD)

FEBC Radio, Manila, 15325 with generic religious program from California in English at 1000-1029* starting with ID loop from *0950 (Ron Howard, China, DXLD) FEBC deleted all English broadcasts from Philippines years ago, but per EIBI and WRTH for A-06 again has this English to SE Asia, plus 1430-1500 on 12130 to S Asia. Unfortunately no local flavor or programming as before (gh) Both contain *Haven Today* (Howard, *ibid.*) Another day at 1000 was *Leading the Way* from the RadioLife mission (Mike Barraclough, UK, WDXC Contact)

ROMANIA RRI changes from May 21 included English: 0400-0456 NAM 11795 ex-11820; 1300-1356 WEu 11845 ex-11830; 1800-1856 WEu 11730 ex-11830 (DX Mix News, Bulgaria)

SERBIA [and non] Is the Bijeljina-Jabanusa [Bosnia-Herzegovina] transmitter of the station formerly known as R. Yugoslavia on the air? Could not confirm the German broadcast Sun-Fri at 2000 on 6100, with DRM QRM from Luxembourg 6095, although Kashi, China, could be heard on 6100 (Kai Ludwig, Germany, DXLD) Have not been able to hear them on 6100 (José Miguel Romero, Spain, *ibid.*) Could not get audio either from website <http://www.radioyu.org/> (Fred Waterer, Ont., *ibid.*) A week later on June 11, however, they did have brief English news on demand, with new ID as Radio Serbia, though Montenegro still included on webpage (gh)

SINGAPORE RSI external service in English at 11-14 on 6080 is ruined by ABC NT service temporary relay via Shepparton; RSI // 6150 is always weaker and with more interference (gh, OK) RSI also weaker than RA here on 6080 (Raúl Saavedra, Costa Rica, DXLD) See AUSTRALIA

SLOVAKIA In late May, RSI reported that a new organizational structure had been approved, including that it should cease SW broadcasts June 30, reduce staff to only two editors for each language, and continue on satellite and internet only (Jean-Michel Aubier, France, DXLD) From May 30, production of new shows other than newscasts ceased; previously recorded features were being repeated, they announced in Spanish (José Miguel Romero, Spain, *ibid.*)

It may be a bit of "brinksmanship" on the part of Miloslava Zemkova to embarrass the government into agreeing to extra funding (Andy Sennitt, *Media Network* blog) I have an impression that Jaroslav Reznik, her predecessor, tried this strategy as well. So I think that it once again remains to be seen if they will really cancel the transmission contract (Kai Ludwig, DXLD)

According to RSI editor-in-chief Ladislav Kubis, the proposal will

not secure quality standard broadcast of the foreign service of public radio as defined by law. However, this proposal was passed by a majority in the final vote (Station website via Edwin Southwell, WDXC *Contact*) Zemkova met June 5 with the President of the Slovak Republic, Ivan Gasparovic, and put forward the idea of maintaining RSI. He said it's not meaningful to speed up things and it would be wise to get to know the coming government's point of view. Furthermore, the head of state underlines that it's very difficult to regain SW frequencies once they have been abandoned (from RSI website in French via Ullmar Qvick, Sweden, DXLD)

If it still exist from July, English to NAm has been scheduled at 0100-0130 on 5930; ironically, only through August is it free of interference from WWCR 5935 which opens an hour later in the summer, but propagation is worst this time of year; also on 9440 to SAm (gh)

SOUTH AFRICA Halfway through the English hour at 0500 on 9685, Channel Africa was heard using the slogan "Voice of African Renaissance." I wonder if this is informal or official (gh)

SUDAN [non] Darfur Salaam, the UK-based humanitarian program, expanded to half an hour at 0500 on 9735 and 11820, adding some local songs and music; also at 1700-1730 on 15515, 17585 (Michael L. Ford, UK, DSWCI *DX Window*) Good here on 17585 (Arnaldo Slaen, Argentina, *ibid.*) And here (Kouji Hashimoto, *Japan Premium*) Originally via Cyprus, but unclear if all frequencies are now, or Ascension? Weekdays only? (gh)

SURINAME [non] During the second half of May only, R. Netherlands added special daily broadcasts via Bonaire, which we first heard for an hour at 2100 and 1400 on 15540, relaying a low-power FM outlet, Radio Boskopoe, in an area hit by severe flooding (gh, OK) Radio Boskopoe, one of our partners, is a local 65-watt public radio station in Totness, capital of the Coronie district, in Dutch and Sranan Tongo, temporarily heard throughout the country, also relayed at 1015-1045 on 6020. RN also made fund-raising broadcasts for aid to Surinam (Andy Sennitt, *Media Network blog*) See <http://www.geocities.com/boskopoe/> (José Miguel Romero, Spain, DXLD)

TIBET Xizang PBS, 9490 heard at 0720-0730 with Holy Tibet in English, music & interview (Iwao Nagatani, *Japan Premium*) Tibet Broadcasting Company also has English lessons daily at 2330-2400, heard on 4820, 5935, 6050, 7170, 7240 (Anker Petersen, Denmark, DSWCI *DX Window*)

TURKEY On at least one occasion in May, Voice of Turkey heard at 2243-2254:20* in English on 7300 instead of scheduled and announced 9830, which was not in English (Harold Frodge, MI, *MARE Tipsheet*)

U K Ian MacRae on the uk-radio-listeners group alerted me that Charlie Gillett has been unwell and has decided he will no longer be able to do his weekly 2-hour show on BBC Radio London. There is more, including an explanation from Charlie of his health problems at his website forum; he is hopeful he will be able to continue his BBC WS show [*World of Music*]: See Sound of the World thread: <http://snipurl.com/rd4f> (Mike Barraclough, *WORLD OF RADIO*) He has been diagnosed with Churg Strauss Syndrome; our wishes for recovery (gh)

U S A If the cuts go through, VOA will rank sixth among the G-8 nations in on-air hours of English, our own language, as Al Jazeera, Russia, China and Iran all expand their English language radio, TV and Internet services! VOA, as of next fall, may well have abolished the radio units in 20 of the 54 language services it had on the air in early 2004. "Incredible... impossible," said one senior American diplomat.

If you listen to VOA Mandarin Chinese, you'll hear jamming just as intense as when it resumed against America's Voice 17 years ago [Tiananmen Square]. Likewise, Beijing is jamming or co-channeling Tibetan and Cantonese, and all transmissions in local languages of Radio Free Asia.

The only U.S. government broadcast service remaining to China in the clear today is none other than its English service, nine hours daily. But if the cuts go through, that will be axed to Asia as of September. Two million Chinese listeners will be cut off, unless they want to tune to the limited vocabulary Special English broadcasts. Our own government jamming itself, all to save the equivalent of about three percent of the U.S. international broadcasting budget next year? The Pentagon spends about that much every 16 to 20 minutes. Only English reaches Chinese in the clear, and more people are learning English in China than speak English in North America (Alan Heil, from a speech to the NASB)

There has never been a strong "radio culture" in China. Regular use rates are among the lowest in the world. There were no significant "peak" years for shortwave use, as there were in eastern Europe. Though percentages are low, the numbers still represent millions. Internet is all the rage in China, but not really for radio. Ownership of SW radios in China was 13% in 2002, 12% in 2004, and 4% in 2005. Weekly use of SW was 4% in 2002 and 3% in 2005 (Stephen Hegarty, Deputy Research Director of InterMedia, NASB Annual Meeting)

SW broadcasts are still the best means of delivery to populations whose governments want to prevent that message from reaching their people. Totally throwing out SW makes no sense unless you want to cede control of your broadcasts to the host country, which is exactly what the BBG has done in many cases. It's not the maligned employees at the Voice of America who are the inflexible ones in this building. It's the

BBG. The sad fact of the matter is that the BBG apparently has NO plan about how to reach the hearts of minds of people in the world. When we should have been in the front lines in fighting the war on terror, the BBG stopped that one cold, preferring to go with pop music as its main weapon in the war of ideas. A special "thank you" to the editors at <http://www.publicdiplomacy.org> for focusing attention on the VOA debate.

VOA has decided to shut down its daily 90-minute SW radio service in Hindi, citing budgetary cutbacks, and the emergence of TV and the Internet in India as the leading media to disseminate news. Private FM radio stations have also affected its listenership, according to Jagdish Sareen, editor, VOA Hindi, quoted by the Indian website DNA. The decision by the Broadcasting Board of Governors is pending with the US Congress for final approval. Albanian, Bosnian, Serbian, and Russian will also stop. Instead, "We will pursue a strategy of reaching our audience through TV programming." (*Media Network*)

How does R. Farda, which receives about \$7 million in federal funding, decide on what to broadcast to Iran? The answer can be found in an anonymous office building off I-95 in Northern Virginia. At the very far desk in a quiet room, Sara Valinejad clicks a computer mouse to determine what any Iranian with an AM or shortwave radio, or an Internet connection, will be able to hear the following day. The guiding philosophy: "In Iran, they don't allow you to be happy," says Valinejad, 30, who emigrated from Iran 10 years ago. Radio Farda, she says, is intended to do the opposite (David Finkel, *Washington Post* via Mike Hardester, Mike Barraclough) It seems she picks all the music (gh)

Alwyn James, former host of VOA's *Daybreak Africa*, died May 2 at 77. His calm voice and delivery made him a favorite among local and international radio audiences (Cleveland Plain Dealer) I remember listening to Al on my shortwave radio, and I always admired the energy and friendliness of his delivery. I think Al's talents were never sufficiently appreciated at VOA. But I'm sure they were in Africa, location of VOA's largest English audience, in the morning, when most Africans listen to the radio (Kim's column, *NASWA Journal*)

The two domestic VOA sites have vastly different Yankee Doodle Dandy versions for sign-on. Greenville's starts at about 3:20 before the hour and is the standard march rendition, and ends out at some point inside the march. Delano's does a medley of portions of YDD, Broadway style. Greenville's YDD sign-off ends out with the very end of YDD and the final three steps in-place of a march. I believe Delano's is shorter; duration is important. I think Botswana's sign-off is a peppy, woodwind version of YDD's end-out and lasts about 10 seconds (Charlie Taylor, NC, DXLD) And is YDD different at each other site?

These people have applied for an HF station in Pensacola FL, and the FCC marked the application acceptable for filing: <http://www.smyrnabaptist.org/> (Benn Kobb, DC, DXLD) The first of many steps; yet another religious broadcaster giving listeners abroad their impression of the US; this one links to an all-music Christian webcast in TX (gh)

WWRB heard testing new 12180 from 2100 past 2300 with Republic Broadcasting Network; announced as trying it instead of 11920. No other SWBC stations are listed on 12180 (gh, OK)

WRNO and their insurance company cannot come to terms as previously thought. They cannot agree on a settlement amount, and are asking for prayers and donations, as of late May (George S. Thurman, TX, DXLD)

On 25950 the narrowband FM studio link of KOA 850, Denver, was audible in May and June just about any time of day or night due to heavy sporadic E, such as at 1800 and even at 0922 with "News Radio KOA" ID, conservative phone-in shows. WWV 20 MHz also audible then (David Hodgson, TN, DXLD) Perhaps they leave 25950 on all the time; helpful for DXing (gh) Also heard earlier in May at 0023 for 30 minutes with Rockies baseball, strong and good quality (Adán Mur, Nembly, Paraguay, *Conexión Digital*) Propagation mode at that distance uncertain; maybe partly Es (gh)

[non] For a week in May, Brother Stair tested via TDF site in French Guiana, power levels ranging from 50 to 500 kW, at 0000-0100 on 13770, first reported by Liz Cameroon, MI; later 1600-1700 on 17720 instead. He said the tests were free and was getting good reports across NAM, but nothing further heard (gh)

If you hear a Brazilian accent on 4990 until 2205*, it's not Brazil, but CVC International, Miami, duplicating via South Africa its Chile 15340 Brazilian service, although that accent is not appropriate for African listeners (gh)

VANUATU R. Vanuatu heard (via a DX-Tuner in Brisbane) on 7260 from tune in 1030 until 1100 blocked by Thailand, talk in local language, some English phrases, sentimental songs, an hour later than scheduled Sunday sign-off 1000 (Stig Hartvig Nielsen, Denmark, DXLD) Also on 7260 at 0630 past 0900 with flute IS at 0659, poor, gone by 0910 recheck, changed to 4960? (David Norcross, Hawaii, DXLD) 7259.53, at 0957 after having been on 3944.84 the previous few weeks. Back on 3944.77 the next day (Dave Valko, PA, HCXD)

Until the Next, Best of DX and 73 de Glenn!

BROADCAST LOGS

NOTEWORTHY LOGS FROM OUR READERS

Gayle Van Horn, W4GVH

gaylevanhorn@monitoringtimes.com

0051 UTC on 4796.53

BOLIVIA: Radio Mallku. Brief Spanish chat to canned ID and closing info to 0108*. Bolivians monitored in Spanish. **Radio Mosoj Chaski** 3310, 0123-0135 fade out. **Radio Santa Cruz** 6134.8, 0856; **Radio San Gabriel** 6079.95, 0918 in Aymara. (Dave Valko, PA/Cumbre DX) **Radio Pio XX** 5952.5, 0943-0959. (Scott Barbour, Intervale, NH)

0322 UTC on 7200

SUDAN: SNBC/Radio Omdurman. Arabic. Regional music vocals to male's talk and Arabic music bits to several mentions of "Sudan." Arabic news to male/female talk 7200, 0338-0345. (Arnaldo Slaen, Buenos Aires, Argentina)

0338 UTC on 6925

PIRATE: WBMK. First log for very well done pirate, consisting mostly of C&W music. Parody ad for Trucker Willy, Biker Babes R Us store and mentions of Sturgeous bike rally. ID at 0404 and email address quote. Additional pirates: **James Bond Radio** 6950, 2330-2348; **Northwoods Radio** 6950, 2359-0041*. (Joe Woods, Greenback, TN; Valko, PA)

0409 UTC on 9905

CLANDESTINE: Radio Nile via Madagascar. Several identifications as "Radio Nile." Announcer's African accented English with spirited discussions about Sudan, and topics including relations between various ethnic and religious groups in Sudan. Fair-good signal. (Wood, TN) Clandestines audible: **West African Democracy Radio** 17875, 1038-1100* (French). **Radio Free Southern Cameroons** 15695, 1756-1900*. (Valko, PA)

0433 UTC on 9970

BELGIUM: RTBF International. French. First log for station for nicely done program of French and English tunes by Sly and the Family Stone and Tina Turner by French DJ format. (Wood, TN)

0552 UTC on 9690

SOUTH AFRICA: Channel Africa. Report on terrorist attack in Egypt and item on the 20th anniversary of the Chernobyl nuclear accident. (Brad Rutherford, Leesburg, GA) 6120, 0350-0355; **Radio Okapi** via Meyerton 11890, 1613-1620 French news on the Congo (Slaen, ARG) Website: www.radiookapi.net/

0950 UTC on 4825

BRAZIL: Radio Cancão Nova. Portuguese. Local songs to "Cancão Nova, en la baixa sa..." SINPO 25432. Brazilians monitored in Portuguese: **Radio Aparecida** 6134.81, 0848; **Radio Marumby** 11749.84, 0902-0930. (Valko, PA) **Radio Educação Rural** (Campo Grande) 4754.9, 0922-0925. (Jim Evans, Germantown, TN) **Radio Senado** 5990, 1000-1005; **Radio Difusora Acreana** 4885, 1007-1012. **Radio Cooperativa** 5983.71, 1104-1125. (Slaen, ARG) **Radio Nacional da Amazonia** 11780, 0220-0232. (Barbour, NH)

0957 UTC on 7259.53

VANUATU: Radio Vanuatu. Audible this morning, despite it being on 3944.84 the past few weeks. Back on 3944.77 the next day. Why change freqs twice in three days? (Valko, PA) 3944.77, 1033-1050 Vernacular language and light vocal tunes. weak/poor signal under static and amateur radio splatter. (Barbour, NH)

1037 UTC on 15295

MALAYSIA: Voice of Malaysia (tent). Mandarin. Male/female talk about music ballads and several mentions of "Malaysia." Good signal observed. **Malaysia's RTM/Trax FM** 7295, 1041-1102. English service with '80s tunes from Hall & Oats and IDs for poor signal. (Barbour, NH)

1016 UTC on 4900.98

BOLIVIA: Radio San Miguel. Spanish. Local news to "Riberalta se ha convertido en el verdadero crisol de la nacionalidad." Bolivians monitored in Spanish: Tentative on **Radio Tacana** 4781.3, 1022-1026; **Radio Virgen de Remedios** 4545.25, 1033-1046 with announcement "de la Cadena Radio Catholica Mundial." (Slaen, ARG)

1044 UTC on 7340

CHINA: Xinjiang People Broadcasting System. Kazakh dialect // 9470 with Chinese music from lady announcer. China's **Yunnan PBS2**, Kumming, Yunnan on 6937, 1049-1053 in Chinese service.

Voice of the Minorities 5420, 1200-1207 with interval signal and Mongolian ID. (Slaen, ARG)

1106 UTC on 4750

INDONESIA: RRI-Makassar. Male's possible news format in Bahasa with mentions of Indonesia. Music program of pop and Indonesian with a unique Indonesian flavor. Poor-moderate signal strength. Indo's audible: **RRI-Fak Fak** 4789.97, 1112-1132; **RRI-Serui** 4604.95, 1116-1132; **RRI-Pontianak** 3976, 1117-1120. (Evans, TN) **RRI-Manokwari** 3987.05, 1006 with bits of audio amid horrible static. (Valko, PA) **Voice of Indonesia** 15149.84, 2000-2016+. (Harold Frodge, Midland, MI)

1130 UTC on 9580

AUSTRALIA: Radio Australia. Health Report on obesity and health concerns. Asia-Pacific program on the concerns of bird flu pandemic. (Bob Fraser, Belfast, ME) Aussie's **ABC Local Radio** 6080, 1019-1113* with programming hosted by Mac Cocker. Broadcast was a temporary one from Shepparton by accident. (Valko, PA)

1140 UTC on 7120

PAPUA NEW GUINEA: Wantok Radio Light. Talk from lady announcer into choir's religious tunes. Good signal with SINPO 34333. (Evan, TN)

1242 UTC on 15240

SWEDEN: Radio. Male/female announcer's feature on lifestyles of the 1960s with focus on cooking and popular music. (Wood, TN; Fraser, ME)

1257 UTC on 17770

TURKEY: Voice of. Poor signal with fades for Turkish service of news and national music. (Wood, TN) English service segment on Armenia at 1840 on 9785; *Hide and Seek in Istanbul* into Turkish music at 2230 on 9830. (Fraser, ME) 7300, 2243-2254* item on Anatolian folk legend. ID/schedules at 2249. (Frodge, MI)

1258 UTC on 17680

CHILE: Voz Christiana. Spanish. Frequencies and schedules to religious Spanish inspirational music. Subsequent log 15340, 2242-2300 in Spanish/English mix of ID, praise music and sermon. (Wood, TN) Monitored 17680, 2027-2035+ Spanish programming for Germany. (Frodge, MI)

1400 UTC 9615

USA: KNLS Alaska. Interval signal followed by male's Chinese announcement. Very poor signal on noisy frequency. Signal disappeared into the noise as programming began. Identified via interval signal. (Evans, TN)

1550 UTC on 13755

CANADA: Radio Austria International relay. Report from Austria focus on high gasoline prices in Europe. **Radio Canada Int'l** 13730 //11765, 1900 news, sports and weather to *Maple Leaf Mailbag*. (Fraser, ME)

1552 UTC on 15455

RUSSIA: Voice of. Victory Day program focus on World War II in Europe. *Music and Musicians* on 11675 at 1720. *Our Homeland* program on 980 at 1933 //12070. (Fraser, ME) **VOR** 9880, 0406 in English with news on relations between the Orthodox Church in the US and Russia. News of rescue mission by a Russian ice-breaker. (Wood, TN)

1955 UTC on 15505

KUWAIT: Radio Kuwait. Arabic. Regional music vocals to station ID at 2000. Newscast to male/female announcer's talk. Brief musical bridges with excellent signal. Observed on parallel freqs 9855 (34333) and 15495 (34333). (Evans, TN)

2218 on 7590 USB

ICELAND: American Forces Radio. NPR series *All Things Considered* on Mars exploration. NPR identification and PSAs at 2228. *Marketplace* at 2230. Iceland's RUV 12115, 2317-2333*. English sound bites to "Ríkisútvarpið" ID at 2325. Musical bridge to sign off. (Barbour, NH)

Thanks to our contributors – Have you sent in YOUR logs?
Send to Gayle Van Horn, c/o Monitoring Times
English broadcast unless otherwise noted.

Parting Thoughts

After nine years, that old bugaboo “circumstance” requires me to take a deep breath and step aside as the writer of this column. It’s really no mystery; in fact, it’s a pretty standard story these days. The day job that provides for me and my family’s livelihood has gotten more demanding of late and there’s just less time for other pursuits. Simple.

Having said that, I firmly believe that this is a good thing! Heck, after nine years the creative well does tend to run dry (or at least drier) and passing the baton to new hands will provide for some fresh perspectives and new approaches to covering this beat. Fred Waterer, who I both know and respect from my own association with the ODXA – and whose writings in *Listening In*, the club bulletin, I’ve enjoyed for many years – will be taking over. I couldn’t be happier about that and I’m sure you soon will be, too.

So, it just remains for me to say thank you to all of you for the friendship and kind words I’ve received over these years. I am proud, with the support of my editor Rachel Baughn, to have inaugurated and maintained for *MT* this monthly review of the programming heard from international broadcasters. With any luck (and a little more spare time), I hope you will still be reading an article or two from me from time to time in this fine magazine. And don’t think that I’m going to miss this opportunity to pass along a few parting thoughts before I ride off into the sunset! (Or should that be “the ether”?)

❖ Music of the World

For a while, it looked like another one of the things that satellite radio was going to do better was world music. Other than playing your own CDs, satellite could offer the best audio quality and, with over a hundred channels per service, 24/7 availability to boot! And both XM and Sirius initially did just that – three such channels between them.

But inexplicably they have both pulled back on that “commitment” (read on) and we’re seemingly back to CDs and international radio to fill the gap. Fortunately, unless the services themselves collapse, shortwave stations will continue to prominently feature their local music – traditional, folk and modern. Good for us!

The best places to look (and listen) are the home language services still targeting North America with robust signals. These include Deutsche Welle in German, Radio

Exterior de España in Spanish, RDP Internacional in Portuguese (fado!), Voice of Greece and the Voice of Turkey. Shortwave being what it is, even services targeting other regions of the world – like Africa No. 1 in Gabon, All India Radio, RNZI and several Middle Eastern broadcasters – will oftentimes provide enjoyable reception and exotic music at the twirl of a dial. For tuning information and program guides (showing programs offering music), refer to the following web sites. Use babelfish.altavista.com for translation assistance.

DW - www.dwelle.de (click on “Deutsch”)
REE - www.rtve.es/ree
RDP - www.rdp.pt (click on “Radio” then “RDP International”)
Voice of Greece - www.voiceofgreece.gr/en
Voice of Turkey - www.trt.tr/voiceofturkey/high.htm (frequency schedule only)
Africa No. 1 - www.africa1.com (click on “Programme” in the left side menu)
All India Radio - allindiaradio.org/schedule/fqsch.html
RNZI - www.rnzi.com and www.rnz.co.nz (click on “National Radio”).

For links to other international broadcaster web sites, consult Daniel Sampson’s excellent Prime Time Shortwave pages at www.primetimeshortwave.com. Click on “international broadcaster links” in the left side menu.

❖ A Sirius Issue

It was bound to happen. Our initial, intense love affair had to cool some. Admittedly, it was almost entirely one-sided – although in the beginning Sirius did profusely proclaim her devotion in numerous and very open and public ways. But I can see now that it was mostly me who fell and fell hard.

How could I not? An inveterate radio listener increasingly disappointed by those broadcasters belittling and abandoning my first love, shortwave; I was immediately smitten with the passion and possibilities of this new young thing. She seemed to love me back, promptly answering all my notes and questions and giving me everything I could possibly ask for – news, music of almost every kind, entertainment in a copious amount that I couldn’t even begin to experience completely. And the BBC! The World Radio Network! Three domestic public radio channels – PRI and two NPRs! Later on, BBC Radio 1 (Could Radio 4 be far behind?) and then four CBC

channels including a longtime favorite, CBC Radio One. Could it possibly get any better?

Then, it happened. Oh, there had been changes – little ones – that probably presaged the Big One. But I really took almost no notice of those – a rock channel dropped here, a hip-hop channel added there. I understand that change is necessary, if all of us are to grow. But when the Big One hit, I was at a loss to understand why.

Without warning, **Horizons** – Sirius’ sole world music channel – was dropped from its line-up and replaced by continuous music from The Rolling Stones. I asked why and the response that came back seemed reasonable. It was explained that a new world music channel – **The Globe** – was being readied and while those preparations proceeded the channel would carry the Stones’ music for a time as a celebration of their coming world tour. I was, to be perfectly honest, a little unhappy that Sirius’ solitary world music channel was being used for this purpose when there were already umpteen pop, rock, rap and hip-hop channels that could have done much more easily with one less. But, **The Globe** would be an improvement (I reasoned to myself); and, besides, Sirius promised that this was only a temporary situation.

I wasn’t alone in my disappointment; or in my reliance on Sirius’ promise that **The Globe** was coming. Months went by, then a year passed, then a few more months. From time to time, I (and others) would ask, “Is **The Globe** still coming?” “Yes,” the answer came back. “Soon.” But with time, we (me and the others) became increasingly concerned that **The Globe** was not in fact coming. After all, it was now well over a year. I decided that there were enough of us that the circumstances surrounding world music and **The Globe** would be a good subject for this column and of interest to readers here. So I contacted Sirius’ press relations department. They had always been helpful before and would likely provide a fuller explanation for all concerned.

But they weren’t and they didn’t. And the more I pressed them for that fuller explanation, the more tightly their representative clung to what I began to perceive as “the official line.” She also got decidedly less friendly, somewhat rude and, finally, inaccessible. She told me I shouldn’t be calling her about this, that my call more properly should go to Customer Care. I explained that I was not inquiring as a customer (although

I am one), but as a columnist on behalf of a readership and, invariably, other subscribers with a common and understandable interest in this subject.

I explained that the same response had been given by Customer Care for over a year and it seemed that Sirius owed its customers a fuller accounting of just what was going on here. Why was the service's solitary world music outlet used instead of other, presumably more easily compressed genres? What about the perception that a listener to a single artist channel could simply load all of his or her CDs into the changer and essentially get the same thing? Is **The Globe** ever really going to debut? Is it proper for Sirius to lead its subscribers on in this fashion? These all seemed reasonable questions, given the situation.

But other than repeating "the official line," she refused to be engaged in a discussion on the subject. She repeated that I should only contact Customer Care about this, a suggestion I was now beginning to find insulting as it insinuated that I lacked legitimacy to be inquiring about these things as a writer. Granted, I don't write for *The New York Times* or *The Wall Street Journal*; but *Monitoring Times* is a decades-old, well-regarded specialist publication and to suggest otherwise... (Take a deep breath.)

Now, a further couple of months after this unfortunate encounter, it's become apparent that Sirius is probably not going to debut a new world music channel. The Sirius web site no longer makes mention of **The Globe** anywhere. (Oddly, at press time, the radios' displays still do.) When I e-mailed Customer Care first to ask if I should read into anything this change, true to form they continued to come back with the same "official line." When I e-mailed my former contact in the press department, she simply ignored my e-mail – an arrogance that no one at Sirius ever displayed when it was an ingénue eagerly looking for attention everywhere and anywhere she could find it.

Admittedly, world music is a minority, specialist interest. But isn't that what Sirius was, at least in part, created for – to serve audiences so poorly served by conventional, terrestrial radio? These and other questions go unanswered because the Sirius press relations department has chosen to insult or ignore, rather than to explain. At first glance, it's a personal affront – yes; but ultimately it's an affront to the readers of this magazine and to at least a segment of the service's subscribers.

Don't get me wrong: There is still much to admire and love about Sirius (and XM, for that matter). But in one sense, I suppose Sirius regards us and our interests as annoyances rather than as an opportunity to engage with an audience and serve it more fully. I wish I could explain it to you. I can only apologize that I can't because...she now refuses to talk to me.

And that's how love goes.

❖ What of the Future?

One question that I am asked regu-

larly concerns whether shortwave as we have known it has a future. The short answer, in my view, is that it does but it's an uncertain one.

Shortwave remains a viable technology; but it has easily recognizable and definable flaws that, in the face of newer international program delivery platforms and technologies, have become magnified. However, the unique advantages that it retains for the foreseeable future is as a vehicle that can effectively overcome man-made encumbrances to access remote or restricted places at very economical cost to the targeted audience.

I continue to maintain that broadcasters like the **BBC** have been too enthusiastic in both their embrace of the new technologies and their rejection of the old ones, regardless of the rather heavily massaged research they tout as vindication for their recent decisions in that regard. There is no doubt, of course, that media is changing and that the practitioners of what we will term here as "the media arts" need to respond to and anticipate these changes to the best of their abilities. In that sense, any criticisms that have been offered in this space have not been intended as harsh rebukes, but rather as alternative perspectives that, in the opinion of this writer, have been too readily ignored or dismissed.

In transforming itself into principally a purveyor of news, the **BBC World Service** has run the risk of making itself a much less complete service and, therefore, much less relevant than it once was globally. Perhaps that was inevitable in our emerging global media environment, and management has made the best of things in taking the courses it has. But one does lament the loss of that "rich mix," nonetheless.

So, too, the opinion here remains that the overseers of U.S. government international broadcasting have unreasonably and unfortunately dissipated an institution globally held in high regard for accuracy and integrity – namely, the **VOA** – in favor of lesser, transitory outlets like **Sawa** (and others) which are correspondingly both more expensive to operate and less valuable to the broader purposes of such pursuits.

As they have in the past, the overriding influences of geopolitics and economics over consumer attitudes will have as much, if not more, to say as technology over whether platforms like DRM (digital shortwave) and satellite profit or fizzle. Shortwave will be affected accordingly, but it's hard to see how it won't continue to be a part of the mix for a considerable time to come.

Incidentally, two new consumer-grade DRM radios from Roberts (Sangean) and Morphy Richards are set to debut on European shelves this fall at around 300 euros (\$360) per unit. Go to www.thiecom.de/drm40.htm for information in German about the Roberts model.

❖ And Lastly...

...I'd like to briefly pass on to you a few of my personal favorite programs, some of which you may not be aware but might enjoy all the same...

Sunday Miscellany [*RTE Ireland, WRN (Sirius 140 and www.wrn.org), 9 a.m. ET Sun.*] is a unique program of often poignant prose, poetry and music, authored and read by both the famous and not famous. It gives insight into the soul of Ireland and its people, but gently so; building a perspective in the listener over time. I try never to miss this one...

Charlie Gillett [*BBCWS, various times on shortwave, Sirius and XM, see www.bbcworldservice.com*] has had to relinquish his program on UK domestic services due to health reasons, but very fortunately for us continues to do his weekly half hour of hand-selected global music on the World Service...

Nuestro Sello, which translates from the Spanish as "Our Label" [R. Exterior de España, 9535/6055 kHz and others, M-F 0230 UT] presents, as the title indicates, music published under RTVE's (REE's domestic parent) music label—all sorts from classical to flamenco to pop...

Unfortunately, reception here is very spotty, but I regularly check for **RAE, Buenos Aires** on 11711 kHz all evening weeknights. Regardless of the language (Spanish, Portuguese, French and English), the relaxed magazine-style presentation always includes a copious amount of Argentine music, especially those wonderful tangos...

A loss that I still feel deeply is that of Swiss Radio International. Fortunately Bob Zannotti (yes, THAT Bob Zannotti of "The Two Bobs" fame) has worked to preserve that friendly feel of those great SRI broadcasts through his "Switzerland in Sound" web site. Go to www.switzerlandinsound.com You can thank me later...

My present five favorite broadcasters in order, just in case you wanted to know:

1. **R. Australia** (the numerous offerings from ABC Radio National are as stimulating as they are daring in demanding that the listener actually think);
2. **R. Netherlands** (programs of such consistently high quality and care for the craft);
3. **R. Sweden** (always an interesting angle on life at the top of Europe);
4. **R. Prague** (a station with a unique personality going back even to the days of Communist rule);
5. A tie: **RNZI** (for its relays of National Radio giving us insight into Kiwi life and its own commitment to covering the Pacific societies) and **BBC World Service** (No. 1 for its news reporting, but losing points for its recent and growing abandonment of its longstanding "rich mix.").

Finis. Au Revoir!

Daniel Sampson's PRIME TIME SHORTWAVE

<http://www.primetimeshortwave.com>

Your guide for up-to-date English shortwave schedules sorted by time, country and frequency plus a DX media program guide and newsletter

THE QSL REPORT

VERIFICATIONS RECEIVED BY OUR READERS

Gayle Van Horn, W4GVH

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Follow-Up Reporting

With the DX season nearing, it's time now to check for reception reports that remain unanswered. Seems like no matter the pleading or special ploy, there are always a few stations that remain on my sought-after QSL list.

When the waiting game has extended into four to six months, a follow-up report should be considered. A follow-up report consists of the original report and a cover letter. The new letter should politely point out that no reply was received to your first communication. Mention the date of the original letter(s) if you like, and a paragraph or two requesting an answer to verify your monitoring.

Your letter should be addressed to the attention of the QSL Manager if one is present, or to the Chief Engineer or the language service for the program language monitored. While some DXers send

their correspondence to a Veri-Signer (an individual reported as having verified in the past), consider that the staff personnel can change, and your letter to Mr. Wylie Coyote may be discarded if he is no longer on the staff. You should not, however, have a problem sending correspondence to signers who are reported regularly.

By now you may have noticed a price adjustment on International Reply Coupons from the US Postal Service. At press time, the new rate (if there is to be one) had not been released. The current IRC is valid through December 31, 2006. The new IRC celebrates the 100th anniversary of the IRC with a new design known as *Beijing Model No 2*. Please refer to the *MT Shortwave Central Blog* at <http://mt-shortwave.blogspot.com/> for updates.

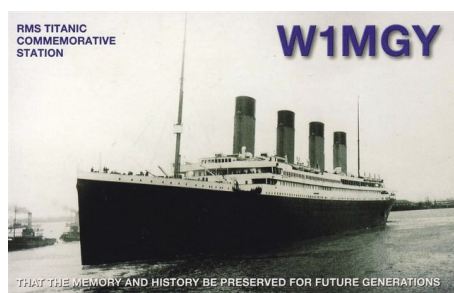
AMATEUR RADIO

Principality of Andorra-C31BO, 20 meters SSB. Full data card, received in 24 days for two US dollars and a nested self-addressed-envelope. QSL address: Chie Guterrez, P.O. Box 2044, Andorra la Vella AD555 Andorra. C31JS, 20 meters SSB. Full data card, received in eight days for two US dollars and a nested self-addressed-envelope. QSL address: Josef Luis Garcia Gonzales, P.O. Box 2151, Andorra la Vella, Andorra. (Ken Reitz KS42R, VA)

AZORES

CU2Z (IOTA EU-003) 15 meters SSB. Full data color scenery card. Received in six months via ARRL bureau. (Larry Van Horn N5FPW, NC)

USA-W1MGY-RMS *Titanic* Commemorative Station, 20 meters SSB. Full data color card of the *Titanic*. Received in 120 days for an SASE to: Titanic Historical Society Inc., P.O. Box 51053, 208 Main St., Indian Orchard, MA 01151-0053. (Van Horn, NC)



Thailand-HS1OVH, 14.0 MHz CW. Full data card. Received in six weeks for a SWL card and one US dollar. QSL address: Malinee Chantramsi, P.O. Box 195 Samsennai, Bangkok 10400 Thailand. (Greg Harris WDX9KHY, Park Forest, IL)

ICELAND

Ríkisútvarpid/Icelandic National Broadcasting Service, 12115 kHz USB. Full data *Blue Lagoon* card, with illegible signature. Received in 57 days for an English report, one US dollar, one IRC, and an applause card. Station address: Icelandic National Broadcasting Service, Efsatletti 1, Reykjavik,

Iceland. Very pleased with this one! Web: www.ruv.is/ (Joe Wood, Greenback, TN)

MARINE COASTAL RADIO

Italy-Roma Radio IAR. Full data QSL sheet. (?) kHz USB. Received in 44 days for a utility report and two US dollars. Station address: Telecom Italia, Stazione Radio Costiera-ROMA, Via della Cesarina, 282, 00139 Roma, Italy. (Jim Pogue, Memphis, TN)

Russia-Kaliningrad Maritime Coast Radio Station- IUW, 12606 kHz USB. Full data card signed by QSL Manager. Received in one month for a utility report and two US dollars. Station address: Victor Zarytovsky/UA2FC, P.O. Box 226, Kaliningrad-15, 236015 Russia. (Pogue, TN)

MEDIUM WAVE

CJWI 1610 kHz AM. Full data prepared QSL card. Received in 11 months after follow-up for CD recording, one US dollar plus an SASE. Station address: Atten: Mr. Badiana Bazin-Director Programming, 3733 Jarry Esy, 2 Étage, Montréal, Québec H1Z 2G1 Canada, (Pogue, TN)

Evangeliums Rundfunk, Mainflingen, 1539 kHz AM. Full data QSL card signed by Jurgen Werth and Lothar Ruhl, plus stickers. Station address: Postfach 150, A-1235 Wien, Austria. (Craig Edwards, Nhulunbuy (Gove) NT Australia)

KRCN, 1060 kHz AM. Friendly QSL note from Ron Nickell-Vice Pres & Gen. Manager. Received in eight days for a CD report, plus business card and info on Radio Colorado Network. Station address: 614 Kimbark St., Longmont, CO 80501-4911. (Patrick Martin, Seaside, OR)

Radio Rebelde 710 kHz AM. Full data card, personal note, sticker and business card. Received in two months for a Spanish report



and mint stamps. Station address: Atten: D. Jorge L. Martin, El Jefe de Relaciones Públicas, Apartado 6277, 10600 La Habana 6, Cuba. (Pogue, TN)

WVNN (*News Talk Radio*) 770 kHz AM. Full data plain white card signed by Josh Bohn-Chief Engineer. Received in 97 days for a taped report, one US dollar and a return address label (used). Station address: Cumulus Broadcasting, 1717 Hwy 72 East, Athens, AL 35611. Web: www.wvnn.com/ (Bill Wilkins, Springfield, MO)

RUSSIA

Radio Prague via Krasnodar 11825 kHz. Full data Josef Bozek-Inventor Series card w/site, plus schedule and coaster souvenir. Received in 19 days for an English report. Station address: Czech Radio, Vinohradská 12, 12099 Prague 2, Czech Republic. Web: www.radio.cz (Edward Kusalik, Alberta, Canada)

SLOVAKIA

Radio Slovakia International 7230 kHz. Partial data winter scenery card of St. Martin's Cathedral, with notation station would be leaving shortwave. Received in 120 days for an English report, one US dollar and one IRC. Station address: Mytna 1, 817 55 Bratislava, Slovakia. Web: www.slovakradio.sk (Wood, TN)

SOUTH AFRICA

Channel Africa, 9685 kHz. Verification letter via email from Kathy Otto-Broadcast Planning, plus schedule. Received in three weeks for an email report to: ottok@sentechn.co.za Web: www.channelafrica.org Station address: P.O. Box 91313, Auckland Park 2006, South Africa. (Brad Rutherford, Leesburg, GA)

SRI LANKA

Deutsche Welle relay 15410 kHz. Full data card signed by Horst Scholz. Received in 120 days for an English report. Station address: 50588 Köln, Germany. Web: www.dw-world.de (Wood, TN)

UKRAINE

Radio Ukraine International 7440 kHz. Full data *Nezalezhnosti-Independence Square* card, plus Easter card and schedule. Received in 43 days for an English report. Station address: Kreshchatyk Str. 26, 01001 Kyiv, Ukraine. Web: www.nrcu.gov.ua (Kusalik, CAN)



HOW TO USE THE SHORTWAVE GUIDE

0000-0100 twhfa USA, Voice of America 5995am 6130ca 7405am 9455af
 ① ② ⑤ ③ ④ ⑥ ⑦

Convert your time to UTC.

Broadcast time on ① and time off ② are expressed in Coordinated Universal Time (UTC) – the time at the 0 meridian near Greenwich, England. To translate your local time into UTC, first convert your local time to 24-hour format, then add (during Daylight Savings Time) 4, 5, 6 or 7 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each hour.

Note that all dates, as well as times, are in UTC; for example, a show which might air at 0030 UTC Sunday will be heard on Saturday evening in America (in other words, 8:30 pm Eastern, 7:30 pm Central, etc.).

Find the station you want to hear.

Look at the page which corresponds to the time you will be listening. On the top half of the page English broadcasts are listed by UTC time on ①, then alphabetically by country ③, followed by the station name ④. (If the station name is the same as the country, we don't repeat it, e.g., "Vanuatu, Radio" [Vanuatu].)

If a broadcast is not daily, the days of broadcast ⑤ will appear in the column following the time of broadcast, using the following codes:

Day Codes	
s/S	Sunday
m/M	Monday
t/T	Tuesday
w/W	Wednesday
h/H	Thursday
f/F	Friday
a/A	Saturday
D	Daily
mon/MON	monthly
occ:	occasional
DRM:	Digital Radio Mondiale

In the same column ⑤, irregular broadcasts are indicated "tent" and programming which includes languages besides English are coded "vl" (various languages).

Choose the most promising frequencies for the time, location and conditions.

The frequencies ⑥ follow to the right of the station listing; all frequencies are listed in kilohertz (kHz). Not all listed stations will be heard from your location and virtually none of them will be heard all the time on all frequencies.

Shortwave broadcast stations change some of their frequencies at least twice a year, in April and October, to adapt to seasonal conditions.

But they can also change in response to short-term conditions, interference, equipment problems, etc. Our frequency manager coordinates published station schedules with confirmations and reports from her monitoring team and MT readers to make the Shortwave Guide up-to-date as of one week before print deadline.

To help you find the most promising signal for your location, immediately following each frequency we've included information on the target area ⑦ of the broadcast. Signals beamed toward your area will generally be easier to hear than those beamed elsewhere, even though the latter will often still be audible.

Target Areas	
af:	Africa
al:	alternate frequency (occasional use only)
am:	The Americas
as:	Asia
au:	Australia
ca:	Central America
do:	domestic broadcast
eu:	Europe
irr:	irregular (Costa Rica RFPI)
me:	Middle East
na:	North America
oc:	Oceania
pa:	Pacific
sa:	South America
va:	various

MT MONITORING TEAM

Gayle Van Horn
Frequency Manager

gaylevanhorn@monitoringtimes.com

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danielsampson@monitoringtimes.com

Thank You ...

Additional Contributors to This Month's Shortwave Guide:

ADDX; Rich D'Angelo/NASWA Flash Sheet; BCL News; Cumbre DX; Adrian Sainsbury/R.NZ Intl; Daniel Sampson/Prime Time-SW; Anker Petersen/DX Window; Md. Azizul Alam Al-Amin Rajshahl, Bangladesh; Harold Sellers/ODXA/DX Ontario; Larry Van Horn N5FPW, MT Asst. Editor; Hard Core DX; NASWA Journal; WWDX.

Shortwave Broadcast Bands

kHz	Meters
2300-2495	120 meters (Note 1)
3200-3400	90 meters (Note 1)
3900-3950	75 meters (Regional band, used for broadcasting in Asia only)
3950-4000	75 meters (Regional band, used for broadcasting in Asia and Europe)
4750-4995	60 meters (Note 1)
5005-5060	60 meters (Note 1)
5730-5900	49 meter NIB (Note 2)
5900-5950	49 meter WARC-92 band (Note 3)
5950-6200	49 meters
6200-6295	49 meter NIB (Note 2)
6890-6990	41 meter NIB (Note 2)
7100-7300	41 meters (Regional band, not allocated for broadcasting in the western hemisphere) (Note 4)
7300-7350	41 meter WARC-92 band (Note 3)
7350-7600	41 meter NIB (Note 2)
9250-9400	31 meter NIB (Note 2)
9400-9500	31 meter WARC-92 band (Note 3)
9500-9900	31 meters
11500-11600	25 meter NIB (Note 2)
11600-11650	25 meter WARC-92 band (Note 3)
11650-12050	25 meters
12050-12100	25 meter WARC-92 band (Note 3)
12100-12600	25 meter NIB (Note 2)
13570-13600	22 meter WARC-92 band (Note 3)
13600-13800	22 meters
13800-13870	22 meter WARC-92 band (Note 3)
15030-15100	19 meter NIB (Note 2)
15100-15600	19 meters
15600-15800	19 meter WARC-92 band (Note 3)
17480-17550	17 meter WARC-92 band (Note 3)
17550-17900	17 meters
18900-19020	15 meter WARC-92 band (Note 3)
21450-21850	13 meters
25670-26100	11 meters

Notes

- Note 1 Tropical bands, 120/90/60 meters are for broadcast use only in designated tropical areas of the world.
- Note 2 Broadcasters can use this frequency range on a (NIB) non-interference basis only.
- Note 3 WARC-92 bands are allocated officially for use by HF broadcasting stations in 2007. They are only authorized on a non-interference basis until that date.
- Note 4 WRC-03 update. After March 29, 2009, the spectrum from 7100-7200 kHz will no longer be available for broadcast purposes and will be turned over to amateur radio operations worldwide

**GLENN HAUSER'S
WORLD OF RADIO**
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For the latest DX and programming news, amateur nets, DX program schedules, audio archives and much more!

0000 UTC - 8PM EDT / 7PM CDT / 5PM PDT

0000	0015	vl	Cambodia, National Radio	11940as	
0000	0015		Japan, Radio Japan/NHK World	13650as	
			17810as		
0000	0015	s	USA, WRMI Miami FL	9955am	
0000	0027		Czech Rep, Radio Prague	7345na	9440na
0000	0030		Australia, HCJB	15405as	15525as
0000	0030		Burma, Dem Voice of Burma	5955eu	
0000	0030		Egypt, Radio Cairo	11950na	
0000	0030		Thailand, Radio	9570va	
0000	0030		UK, BBC World Service	3915as	5970as
			9740as	9790as	11945as
			17615as		15360as
0000	0030		USA, Voice of America	7555as	
0000	0045		India, All India Radio	9705as	9950as
			11620as	11645as	13605as
0000	0045		USA, WYFR Okeechobee FL	17805am	
0000	0057		Canada, Radio Canada Intl	11700as	
0000	0059		Canada, Radio Canada Intl	9755am	
0000	0059		Spain, Radio Exterior Espana	15385am	
0000	0100		Anguilla, University Network	6090am	
0000	0100		Australia, ABC NT Alice Springs	2310irr	
			4835do		
0000	0100		Australia, ABC NT Katherine	5025do	
0000	0100		Australia, ABC NT Tennant Creek	4910do	
0000	0100		Australia, Radio	9660pa	12080pa
			15240va	17715pa	17750as
			17795va		
0000	0100		Canada, CFRX Toronto ON	6070na	
0000	0100		Canada, CFVP Calgary AB	6030na	
0000	0100		Canada, CKZN St John's NF	6160na	
0000	0100		Canada, CKZU Vancouver BC	6160na	
0000	0100		China, China Radio Intl	6020na	7180as
			9515as	9570na	13600eu
0000	0100		Costa Rica, University Network	6150va	7375va
			6150va	7375va	9725va
0000	0100		Germany, Deutsche Welle	9695as	9825as
			9885as		
0000	0100		Guyana, Voice of	3291do	
0000	0100		Japan, Radio Japan/NHK World	6145na	
0000	0100		Malaysia, RTM/Trax FM	7295as	
0000	0100	vl	Namibia, Namibian BC Corp	3270do	3290do
			6060do	6175do	
0000	0100		Netherlands, Radio	9845na	
0000	0100		New Zealand, Radio NZ Intl	13730pa	
0000	0100	DRM	New Zealand, Radio NZ Intl	15720pa	
0000	0100	vl	Papua New Guinea, Wantok R.	7120va	
0000	0100		Singapore, MediaCorp Radio	6150do	
0000	0100		UK, BBC World Service	6195as	9410as
			11955as	15280as	15310as
0000	0100	DRM	UK, BBC World Service	6010na	
0000	0100	f	UK, Bible Voice	6140me	
0000	0100	f	UK, Bible Voice	6140me	
0000	0100		Ukraine, Radio Ukraine Intl	7440va	
0000	0100		USA, American Forces Radio	4319usb	5446usb
			5765usb	6350usb	7812usb
			10320usb	12133usb	12579usb
			13855usb		13362usb
0000	0100		USA, KAIJ Dallas TX	5755na	
0000	0100		USA, KTBN Salt Lake City UT	7505na	
0000	0100		USA, WBCQ Kennebunk ME	5110na	7415na
			9330na		
0000	0100		USA, WBOH Newport NC	5920am	
0000	0100		USA, WEWN Birmingham AL	5035va	5835va
0000	0100		USA, WHRA Greenbush ME	7520na	
0000	0100	m	USA, WHRI Noblesville IN	7490am	7555am
0000	0100	twhfa	USA, WHRI Noblesville IN	9820am	13760am
0000	0100		USA, WINB Red Lion PA	9265am	
0000	0100	twhfa	USA, WRMI Miami FL	7385am	
0000	0100		USA, WTJC Newport NC	9370na	
0000	0100		USA, WWCR Nashville TN	5070na	7465na
			9985na	13845na	
0000	0100		USA, WWRB Manchester TN	3185na	5050na
			5745na	6890na	
0000	0100		USA, WYFR Okeechobee FL	6065am	9505am
			11835am		
0000	0100		Zambia, Christian Voice	4965af	
0015	0030	m	USA, WRMI Miami FL	9955am	
0030	0045	s	Germany, Pan American BC	9640as	
0030	0045	s	USA, WRMI Miami FL	9955am	
0030	0100		Lithuania, Radio Vilnius	9875na	
0030	0100		Thailand, Radio	5890na	
0030	0100		UK, BBC World Service	5970as	6195as
			9410as	9790as	11955as
			15310as	15360as	15280as
0030	0100		USA, Voice of America	9715va	9780va
			15185va	15205va	15290va
			17740va	17820va	15560va
0035	0100	sm	Austria, Radio Austria Intl	9870am	
0043	0058	twhfa	Austria, Radio Austria Intl	9870am	
0055	0100		Italy, RAI Intl	11800na	

0100 UTC - 9PM EDT / 8PM CDT / 6PM PDT

0100	0100		Cuba, Radio Havana	6000na	6060na
			9820na		
0100	0115		Italy, RAI Intl	11800na	
0100	0127		Czech Rep, Radio Prague	6200na	7345na
0100	0128		Vietnam, Voice of	6175na	
0100	0129	s	Germany, Universal Life	9480as	
0100	0130		Hungary, Radio Budapest	9590na	
0100	0156		Romania, Radio Romania Intl	9690na	11825na
0100	0159		Canada, Radio Canada Intl	9755am	13710am
0100	0200		Anguilla, University Network	6090am	
0100	0200		Australia, ABC NT Katherine	5025do	
0100	0200		Australia, ABC NT Tennant Creek	4910do	
0100	0200		Australia, CVC International	7355as	
0100	0200		Australia, Radio	9660pa	12080pa
			15240va	15415va	17715pa
			17775va	17795va	17750as
0100	0200		Canada, CFRX Toronto ON	6070na	
0100	0200		Canada, CFVP Calgary AB	6030na	
0100	0200		Canada, CKZN St John's NF	6160na	
0100	0200		Canada, CKZU Vancouver BC	6160na	
0100	0200	DRM	China, China Radio Intl	6140na	
0100	0200		China, China Radio Intl	6020na	6080na
			9570na	9580na	9790na
			13600eu	13640as	11870as
0100	0200		Costa Rica, University Network	6150va	7375va
0100	0200		Guyana, Voice of	3291do	9725va
0100	0200		Indonesia, Voice of	15150al	9525as
0100	0200		Japan, Radio Japan/NHK World	5960va	17685oc
			11720va	11935sa	15325as
			17810as	17825va	17845as
0100	0200		Malaysia, RTM/Trax FM	7295as	
0100	0200	vl	Namibia, Namibian BC Corp	3270do	3290do
			6060do	6175do	
0100	0200		Netherlands, Radio	9845na	
0100	0200		New Zealand, Radio NZ Intl	13730pa	
0100	0200	DRM	New Zealand, Radio NZ Intl	15720pa	
0100	0200		North Korea, Voice of Korea	7140as	9345as
			9730am	11735ca	13760ca
0100	0200	vl	Papua New Guinea, Wantok R.	7120va	15180ca
0100	0200		Russia, Voice of	7250na	9665na
			15595na		15555na
0100	0200		Singapore, MediaCorp Radio	6150do	
0100	0200		Sri Lanka, SLBC	6005eu	9770do
0100	0200		Taiwan, Radio Taiwan Intl	11875as	15745eu
0100	0200		UK, BBC World Service	6195as	9410as
			11955as	15280as	15310as
			17790as		15360as
0100	0200	f	UK, Bible Voice	6140me	
0100	0200		USA, American Forces Radio	4319usb	5446usb
			5765usb	6350usb	7590usb
			10320usb	12133usb	12579usb
			13855usb		13362usb
0100	0200		USA, KAIJ Dallas TX	5755na	
0100	0200		USA, KTBN Salt Lake City UT	7505na	
0100	0200		USA, KWHR Naalehu HI	17655as	
0100	0200		USA, Voice of America	9885va	11705va
			11725va		
0100	0200		USA, WBCQ Kennebunk ME	5110na	7415na
			9330na		
0100	0200		USA, WBOH Newport NC	5920am	
0100	0200		USA, WEWN Birmingham AL	5035va	5835va
0100	0200		USA, WHRA Greenbush ME	5850na	
0100	0200		USA, WHRI Noblesville IN	7490am	7555am
			9515am		
0100	0200	sm	USA, WHRI Noblesville IN	7315am	
0100	0200		USA, WINB Red Lion PA	9265am	
0100	0200	twhfa	USA, WRMI Miami FL	7385am	
0100	0200	s	USA, WRMI Miami FL	9955am	
0100	0200		USA, WTJC Newport NC	9370na	
0100	0200		USA, WWCR Nashville TN	3215na	5070na
			5765na	13845na	
0100	0200		USA, WWRB Manchester TN	3185na	5050na
			5745na	6890na	
0100	0200		USA, WYFR Okeechobee FL	6065va	9505va
			15195va		
0100	0200		Uzbekistan, Christian Vision	7355as	
0100	0200		Zambia, Christian Voice	4965af	
0105	0130	sm	Austria, Radio Austria Intl	9870am	
0113	0130	twhf	Austria, Radio Austria Intl	9870am	
0115	0130	twhf	Armenia, FEBA	7365as	
0115	0130	a	Austria, Radio Austria Intl	9870na	
0130	0200		Iran, Voice of the Islamic Rep	7235am	9495am
0130	0200		Sweden, Radio	6010na	9435va
0130	0200	twhfa	USA, Voice of America	7405am	13740am
0133	0200	sm	Austria, Radio Austria Intl	9870na	
0140	0200		Vatican City, Vatican Radio	7335as	9650as
0143	0158	twhfa	Austria, Radio Austria Intl	9870na	
0145	0200	twhf	Albania, Radio Tirana	6115eu	7455eu
0145	0200	w	Australia, HCJB	15405as	

0200 UTC - 10PM EDT / 9PM CDT / 7PM PDT

0200	0215	Croatia, Croatian Radio	9925na	
0200	0230	Iran, Voice of the Islamic Rep	7235am	9495am
0200	0230	Thailand, Radio	5980na	
0200	0245	USA, WYFR Okeechobee FL	11835va	
0200	0300	Anguilla, University Network	6090am	
0200	0300	Argentina, RAE	11710am	
0200	0300	Australia, ABC NT Alice Springs		2310irr
		4835do		
0200	0300	Australia, ABC NT Katherine	5025do	
0200	0300	Australia, ABC NT Tennant Creek		4910do
0200	0300	Australia, CVC International	7355as	
0200	0300	Australia, Radio	9660pa	13630pa
		13670pa	15240va	15415va
		17750as	21725va	
0200	0300	Bulgaria, Radio	9700na	11700na
0200	0300	Canada, CFRX Toronto ON	6070na	
0200	0300	Canada, CFVP Calgary AB	6030na	
0200	0300	Canada, CKZN St John's NF	6160na	
0200	0300	Canada, CKZU Vancouver BC	6160na	
0200	0300	China, China Radio Intl	11870as	13640as
0200	0300	Costa Rica, University Network		5030va
		6150va	7375va	
0200	0300	Cuba, Radio Havana	6000na	6060na
		9820na		
0200	0300	Egypt, Radio Cairo	7270na	
0200	0300	Guyana, Voice of	3291do	
0200	0300	Malaysia, RTM/Trax FM	7295as	
0200	0300	Namibia, Namibian BC Corp	3270do	3290do
		6060do	6175do	
0200	0300	New Zealand, Radio NZ Intl	13730pa	
0200	0300	New Zealand, Radio NZ Intl	15720pa	
0200	0300	North Korea, Voice of Korea	13650as	15100as
0200	0300	Papua New Guinea, Wantok R.Light		7120va
0200	0300	Philippines, Radio Pilipinas	11885va	15270va
		17665va		
0200	0300	Russia, Voice of	9665na	9860na
		15595na		15555na
0200	0300	Singapore, MediaCorp Radio	6150do	
0200	0300	South Korea, KBS World Radio		9560na
		11810sa	15575na	
0200	0300	UK, BBC World Service	6195me	11760me
		11955as	15280as	15310as
		17790as		15360as
0200	0300	USA, American Forces Radio	4319usb	5446usb
		5765usb	6350usb	7590usb
		10320usb	12133usb	7812usb
		13855usb	12579usb	13362usb
0200	0300	USA, KAIJ Dallas TX	5755na	
0200	0300	USA, KJES Vado NM	7555na	
0200	0300	USA, KTNB Salt Lake City UT	7505na	
0200	0300	USA, KWHR Naalehu HI	17655as	
0200	0300	USA, WBCQ Kennebunk ME	5110na	7415na
		9330na		
0200	0300	USA, WBOH Newport NC	5920am	
0200	0300	USA, WEWN Birmingham AL	5035va	5835va
0200	0300	USA, WHRA Greenbush ME	5850na	
0200	0300	USA, WHRI Noblesville IN	7315am	
0200	0300	USA, WHRI Noblesville IN	5875am	7490am
		9515am		
0200	0300	USA, WINB Red Lion PA	9265am	
0200	0300	USA, WRMI Miami FL	7385am	
0200	0300	USA, WRMI Miami FL	7385am	
0200	0300	USA, WTJC Newport NC	9370na	
0200	0300	USA, WWCR Nashville TN	3215na	5070na
		5765na	5935na	
0200	0300	USA, WWRB Manchester TN	3185na	5050na
		5745na	6890na	
0200	0300	USA, WYFR Okeechobee FL	5985va	6065va
		9505va	11855va	
0200	0300	Uzbekistan, Christian Vision	7355as	
0200	0300	Zambia, Christian Voice	4965af	
0200	3000	Taiwan, Radio Taiwan Intl	5950na	9680na
0215	0220	Vatican City, Vatican Radio	15560oc	
0215	0230	Nepal, Radio	3230as	5005as
		7165as		6100as
0230	0258	Vietnam, Voice of	6175na	
0230	0300	Albania, Radio Tirana	6115eu	7455eu
0230	0300	Hungary, Radio Budapest	7975eu	
0230	0300	Sweden, Radio	6010na	
0245	0300	Myanmar, Radio	9730do	
0250	0300	Vatican City, Vatican Radio	7305am	9610am

0300 UTC - 11PM EDT / 10PM CDT / 8PM PDT

0300	0320	Vatican City, Vatican Radio	7305am	9610am
0300	0327	Czech Rep, Radio Prague	7345na	9870na
0300	0330	Belarus, Radio	6155eu	7210eu
0300	0330	Egypt, Radio Cairo	7270na	
0300	0330	Myanmar, Radio	9730do	
0300	0330	Philippines, Radio Pilipinas	11885va	15270va
		17665va		
0300	0330	UK, BBC World Service	3255af	6005af

		6035af	6190af	7160af	9750af
		12035af			
0300	0330	USA, KJES Vado NM		7555na	
0300	0330	USA, Voice of America		4930af	6080af
		7340af	9885af	12080af	15580af
0300	0330	USA, WBCQ Kennebunk ME		5110na	7415na
		9330na			
0300	0330	Vatican City, Vatican Radio		9660af	
0300	0350	Turkey, Voice of	5975va	7270va	
0300	0355	South Africa, Channel Africa		5960af	
0300	0400	Anguilla, University Network		6090am	
0300	0400	Australia, ABC NT Alice Springs			2310irr
		4835do			
0300	0400	Australia, ABC NT Katherine		5025do	
0300	0400	Australia, ABC NT Tennant Creek			4910do
0300	0400	Australia, CVC International		13685as	
0300	0400	Australia, Radio	9660pa	12080pa	13630pa
		13670va	15240va	15415va	15515va
		17750as	21725va		
0300	0400	Canada, CBC NQ SW Service		9625na	
0300	0400	Canada, CFRX Toronto ON		6070na	
0300	0400	Canada, CFVP Calgary AB		6030na	
0300	0400	Canada, CKZN St John's NF		6160na	
0300	0400	Canada, CKZU Vancouver BC		6160na	
0300	0400	China, China Radio Intl		9690na	9790na
		11870as	15110as		
0300	0400	Costa Rica, University Network			5030va
		6150va	7375va	9725va	
0300	0400	Cuba, Radio Havana		6000na	6060na
		9820na			
0300	0400	Guyana, Voice of	3291do		
0300	0400	Japan, Radio Japan/NHK World			21610oc
0300	0400	Malaysia, RTM/Trax FM		7295as	
0300	0400	Malaysia, Voice of	6175as	9750as	15295as
0300	0400	Namibia, Namibian BC Corp		3270do	3290do
		6060do	6175do		
0300	0400	New Zealand, Radio NZ Intl		13730pa	
0300	0400	New Zealand, Radio NZ Intl		15720pa	
0300	0400	North Korea, Voice of Korea		7140as	9345as
		9730as			
0300	0400	Oman, Radio Oman		15355as	
0300	0400	Papua New Guinea, Wantok R.Light			7120va
0300	0400	Russia, Voice of	9665na	9860na	9880na
		15425na	15455na	15555na	15595na
0300	0400	Rwanda, Radio		6055do	
0300	0400	Singapore, MediaCorp Radio		6150do	
0300	0400	South Africa, Channel Africa		3345af	
0300	0400	Taiwan, Radio Taiwan Intl		5950va	15215va
		15320va			
0300	0400	UK, BBC World Service		6195va	9410eu
		11760me	15575me		
0300	0400	Ukraine, Radio Ukraine Intl		7440na	
0300	0400	USA, American Forces Radio		4319usb	5446usb
		5765usb	6350usb	7590usb	7812usb
		10320usb	12133usb	12579usb	13362usb
		13855usb			
0300	0400	USA, KAIJ Dallas TX		5755na	
0300	0400	USA, KTNB Salt Lake City UT		7505na	
0300	0400	USA, KWHR Naalehu HI		17655as	
0300	0400	USA, WBCQ Kennebunk ME		5110na	7415na
0300	0400	USA, WBOH Newport NC		5920am	
0300	0400	USA, WEWN Birmingham AL		5035va	5835va
0300	0400	USA, WHRA Greenbush ME		5850na	
0300	0400	USA, WHRI Noblesville IN		5860am	
0300	0400	USA, WHRI Noblesville IN		7520am	
0300	0400	USA, WHRI Noblesville IN		5875am	7315am
0300	0400	USA, WINB Red Lion PA		9265am	
0300	0400	USA, WRMI Miami FL		7385am	
0300	0400	USA, WRMI Miami FL		9955am	
0300	0400	USA, WTJC Newport NC		9370na	
0300	0400	USA, WWCR Nashville TN		3215na	5070na
		5765na	5935na		
0300	0400	USA, WWRB Manchester TN		3185na	5050na
		5745na	6890na		
0300	0400	USA, WYFR Okeechobee FL		6065am	9505am
		11740am	15255am		
0300	0400	Uzbekistan, Christian Vision		13685as	
0300	0400	Zambia, Christian Voice		4965af	
0300	0400	Zimbabwe, ZBC Corp		5975do	
0300	0500	UK, Sudan Radio Service		7120af	
0330	0345	Israel, Kol Israel		11590va	17600va
0330	0357	Czech Rep, Radio Prague		9445va	11600va
0330	0358	Vietnam, Voice of		6175am	
0330	0400	Belarus, Radio		5970eu	6155eu
0330	0400	UK, BBC World Service		3255af	6005af
		6035af	6190af	7160af	9750af
		12035af	15420af		
0330	0400	USA, Voice of America		4930af	6080af
		9885af	12080af	12080af	15580af
0330	0400	USA, WBCQ Kennebunk ME		9330na	

0400 UTC - 12AM EDT / 11PM CDT / 9PM PDT

0400	0427	Czech Rep, Radio Prague		6100na	
0400	0430	France, Radio France Intl		9805af	11700af

0400	0430	USA, Voice of America	4930af	4960af	
		6080af	7405af	9575af	9885af
		11835af	12080af	15580af	
0400	0445	USA, WYFR Okeechobee FL	6065va	6855va	
		9505va			
0400	0456	Romania, Radio Romania Intl	9780va	11795na	
		15110va	17780va		
0400	0458	New Zealand, Radio NZ Intl	13730pa		
0400	0458	DRM New Zealand, Radio NZ Intl	15720pa		
0400	0459	South Africa, Channel Africa	3345af		
0400	0500	Anguilla, University Network	6090am		
0400	0500	Australia, ABC NT Alice Springs		2310irr	
		4835do			
0400	0500	Australia, ABC NT Katherine	5025do		
0400	0500	Australia, ABC NT Tennant Creek		4910do	
0400	0500	Australia, CVC International	13685as		
0400	0500	Australia, Radio	9660pa	13670va	
		15240pa	15415va	15515va	21725va
0400	0500	Canada, CBC NQ SW Service	9625na		
0400	0500	Canada, CFRX Toronto ON	6070na		
0400	0500	Canada, CKZN St John's NF	6160na		
0400	0500	Canada, CKZU Vancouver BC	6160na		
0400	0500	China, China Radio Intl	6020na	6080na	
		9560na	9755na	11750af	
0400	0500	Costa Rica, University Network		5030va	
		6150va	7375va	9725va	
0400	0500	Cuba, Radio Havana	6000na	6060na	
		9820na			
0400	0500	Germany, Deutsche Welle	7225af	9630af	
		12045af	15445af		
0400	0500	Guyana, Voice of	3291do		
0400	0500	Malaysia, RTM/Trax FM	7295as		
0400	0500	Malaysia, Voice of 6175as	9750as	15295as	
0400	0500	Namibia, Namibian BC Corp	3270do	3290do	
		6060do	6175do		
0400	0500	Nigeria, Radio/Kaduna	6090do		
0400	0500	Papua New Guinea, Wantok R.Light		7120va	
0400	0500	Russia, Voice of	9665na	9860na	9880na
		15555na			
0400	0500	Rwanda, Radio	6055do		
0400	0500	Singapore, MediaCorp Radio	6150do		
0400	0500	Uganda, Radio	4976do	7196do	
0400	0500	UK, BBC World Service	3255af	6005af	
		6190af	6195eu	7120af	7160af
		9410va	11760me	12035af	15280as
		15310as	15360as	15420af	15575me
		17760as	17790as	21660as	
0400	0500	UK, BBC World Service	6010na		
0400	0500	USA, American Forces Radio	4319usb	5446usb	
		5765usb	6350usb	7590usb	7812usb
		10320usb	12133usb	12579usb	13362usb
		13855usb			
0400	0500	USA, KALJ Dallas TX	5755na		
0400	0500	USA, KLTN Salt Lake City UT	7505na		
0400	0500	USA, KWHR Naalehu HI	17655as		
0400	0500	USA, WBCQ Kennebunk ME	5110na	7415na	
0400	0500	USA, WBOH Newport NC	5920am		
0400	0500	USA, WEWN Birmingham AL	5035va	5835va	
0400	0500	USA, WHRA Greenbush ME	5850na		
0400	0500	USA, WHRI Noblesville IN	5860am		
0400	0500	USA, WHRI Noblesville IN	7520am		
0400	0500	USA, WHRI Noblesville IN	5875am	7315am	
0400	0500	USA, WMLK Bethel PA	9265eu		
0400	0500	USA, WRMI Miami FL	9955am		
0400	0500	USA, WTJC Newport NC	9370na		
0400	0500	USA, WWCN Nashville TN	3215na	5070na	
		5765na	5935na		
0400	0500	USA, WWRB Manchester TN	3185na	5050na	
		5745na	6890na		
0400	0500	USA, WYFR Okeechobee FL	7780va	9715va	
0400	0500	Uzbekistan, Christian Vision	13685as		
0400	0500	Zambia, Christian Voice	4965af	6065af	
0400	0500	Zimbabwe, ZBC Corp	5975do		
0400	0500	Netherlands, Radio	6165am	9590va	
0430	0500	Nigeria, Radio/Ibadan	6050do		
0430	0500	Nigeria, Radio/Kaduna	4770do		
0430	0500	Nigeria, Radio/Lagos	3326do	4990do	
0430	0500	Swaziland, TWR	3200af		
0430	0500	USA, Voice of America	4930af	4960af	
		6080af	7405af	9575af	11835af
		12080af	15580af		
0445	0500	Italy, RAI Intl	6110af	6145af	7235af
0459	0500	New Zealand, Radio NZ Intl	9615pa		
0459	0500	DRM New Zealand, Radio NZ Intl	9440pa		

0500 UTC - 1AM EDT / 12AM CDT / 10PM PDT

0500	0507	twhf	Canada, CBC NQ SW Service	9625na	
0500	0520		Vatican City, Vatican Radio	5885eu	7250eu
			9645eu		
0500	0530	mtwhf	France, Radio France Intl	13680af	15160af
0500	0530	vi	Rwanda, Radio	6055do	
0500	0530		UK, BBC World Service	6005af	6190af
			6195eu	7160af	9410af
			11955as	15280as	15310as
					15360as

				15420af	17640af	17760as	17790as
				17885af	21660as		
0500	0530		Vatican City, Vatican Radio			9660af	11625af
			13765af				
0500	0555		South Africa, Channel Africa			9685af	
0500	0600		Anguilla, University Network			6090am	
0500	0600		Australia, ABC NT Alice Springs				2310irr
			4835do				
0500	0600		Australia, ABC NT Katherine			5025do	
0500	0600		Australia, ABC NT Tennant Creek				4910do
0500	0600		Australia, CVC International			13685as	
0500	0600		Australia, Radio	9660pa	12080pa		13670va
			15160va	15240va	15415va		15515va
			17750as				
0500	0600		Bhutan, BBS	6035as			
0500	0600		Canada, CFRX Toronto ON		6070na		
0500	0600		Canada, CKZN St John's NF		6160na		
0500	0600		Canada, CKZU Vancouver BC		6160na		
0500	0600		China, China Radio Intl		6020na	6190na	
			9560na	11880as	15350as		15360af
			15465as	17505as	17540as		
0500	0600		Costa Rica, University Network			5030va	
			6150va	7375va	9725va		
0500	0600		Cuba, Radio Havana		6000va	6060va	
			9550va	9820va	11760va		
0500	0600		Germany, CVC The Voice Africa			9430af	
0500	0600		Germany, Deutsche Welle		9630af	9700af	
			15410af	17800af			
0500	0600		Guyana, Voice of	3291do			
0500	0600	mtwhf	Italy, IRRS	5775va			
0500	0600		Japan, Radio Japan/NHK World			5975eu	
			6110na	7230eu	15195as		17810as
			21755oc				
0500	0600		Malaysia, RTM/Trax FM		7295as		
0500	0600		Malaysia, Voice of 6175as		9750as	15295as	
0500	0600	vi	Namibia, Namibian BC Corp		3270do	3290do	
			6060do	6175do			
0500	0600		New Zealand, Radio NZ Intl		9615pa		
0500	0600	DRM	New Zealand, Radio NZ Intl		9440pa		
0500	0600		Nigeria, Radio/Ibadan		6050do		
0500	0600		Nigeria, Radio/Kaduna		4770do	6090do	
0500	0600		Nigeria, Radio/Lagos		3326do	4990do	
0500	0600	vi	Papua New Guinea, Wantok R.Light			7120va	
0500	0600		Russia, Voice of	17635oc	21790oc		
0500	0600		Singapore, MediaCorp Radio		6150do		
0500	0600		South Africa, Channel Africa		7240af		
0500	0600		Swaziland, TWR	3200af	4775af	9500af	
0500	0600	vi	Uganda, Radio	4976do	5026do	7196do	
0500	0600		UK, BBC World Service		11760me	15575me	
0500	0600	vi/ mtwhf	UK, Sudan Radio Service		9525af		
0500	0600		USA, American Forces Radio		4319usb	5446usb	
			5765usb	6350usb	7590usb	7812usb	
			10320usb	12133usb	12579usb	13362usb	
			13855usb				
0500	0600		USA, KALJ Dallas TX		5755na		
0500	0600		USA, KLTN Salt Lake City UT		7505na		
0500	0600		USA, KWHR Naalehu HI		11565as	13650as	
0500	0600		USA, Voice of America		4930af	6080af	
			6180af	7405af	12080af	15580af	
0500	0600		USA, WBCQ Kennebunk ME		5110na	7415na	
0500	0600		USA, WBOH Newport NC		5920am		
0500	0600		USA, WEWN Birmingham AL		5050va	5850va	
0500	0600		USA, WHRA Greenbush ME		6145na		
0500	0600	twhfa	USA, WHRI Noblesville IN		5860am	7465am	
0500	0600	sm	USA, WHRI Noblesville IN		7315am		
0500	0600	mtwhfa	USA, WMLK Bethel PA		9265eu		
0500	0600	asm	USA, WRMI Miami FL		9955am		
0500	0600		USA, WTJC Newport NC		9370na		
0500	0600		USA, WWCN Nashville TN		3215na	5070na	
			5765na	5935na			
0500	0600		USA, WWRB Manchester TN		3185na		
0500	0600		USA, WYFR Okeechobee FL		6855va	9355va	
0500	0600		Uzbekistan, Christian Vision		13685as		
0500	0600		Zambia, Christian Voice		4965af	6065af	
0500	0600	vi	Zimbabwe, ZBC Corp		5975do		
0505	0520	m	Austria, Radio Austria Intl		17870me		
0505	0530	as	Austria, Radio Austria Intl		17870me		
0515	0600		Germany, CVC The Voice Africa			9555af	
			15715af				
0525	0600	vi	Ghana, Ghana BC Corp		3366do	4915do	
0530	0600		Thailand, Radio	17655eu			
0530	0600		UK, BBC World Service		3255af	6005af	
			6190af	6195eu	7160af	9410af	
			11765af	11955as	15310as	15360as	
			15420af	17640af	17760as	21660as	
0530	0600	mtwhf	UK, BBC World Service		17885af		
0530	0600	vi/ mtwhf	Vatican City, Vatican Radio		6185va		
0535	0600	as	Austria, Radio Austria Intl		17870me		
0545	0600	twhf	Austria, Radio Austria Intl		17870me		
0545	0600	vi	Rwanda, Radio	6055do			

0600 UTC - 2AM EDT / 1AM CDT / 11PM PDT

0600	0615	as	South Africa, TWR	11640af	
0600	0630	mtwhf	France, Radio France Intl		15160af
					17800af

0600	0630		UK, BBC World Service	6005af	6190af
			9410af 9530af 12095af 17640af	11765af	11940af
0600	0645	mtwhf	South Africa, TWR	11640af	
0600	0645	vl/ mtwhf	Vatican City, Vatican Radio	6185va	
0600	0655		South Africa, Channel Africa	15255af	
0600	0658	DRM	New Zealand, Radio NZ Intl	9615pa	
0600	0658		New Zealand, Radio NZ Intl	9440pa	
0600	0659		South Africa, Channel Africa	7240af	
0600	0700		Anguilla, University Network	6090am	
0600	0700		Australia, ABC NT Alice Springs	4835do	2310irr
0600	0700		Australia, ABC NT Katherine	5025do	
0600	0700		Australia, ABC NT Tennant Creek	4910do	
0600	0700		Australia, CVC International	15335as	
0600	0700		Australia, Radio	9660pa 15160va 15240va 17750as	13670va 15515va
0600	0700		Canada, CFRX Toronto ON	6070na	
0600	0700		Canada, CFVP Calgary AB	6030na	
0600	0700		Canada, CKZN St John's NF	6160na	
0600	0700		Canada, CKZU Vancouver BC	6160na	
0600	0700		China, China Radio Intl	11870as	11880as
			13620as 15350as 17505as 17540as	15465as	17490eu
0600	0700		Costa Rica, University Network	6150va 7375va 9725va	5030va 11870va
0600	0700		Cuba, Radio Havana	9550va 9820va	6000va 6060va
0600	0700		Germany, CVC The Voice Africa	15640af	9555af
0600	0700		Germany, Deutsche Welle	15275af 17860af	6140eu 7170af
0600	0700	vl	Ghana, Ghana BC Corp	3366do	4915do
0600	0700		Guyana, Voice of	3291do	
0600	0700		Italy, IRRS	13840va	
0600	0700		Japan, Radio Japan/NHK World	11740as 11760eu 13630va 17870pa 21755oc 4760do	11715eu 15195as
0600	0700		Liberia, ELWA	4760do	
0600	0700		Malaysia, RTM/Trax FM	7295as	
0600	0700		Malaysia, Voice of	6175as	9750as 15295as
0600	0700	vl	Namibia, Namibian BC Corp	6060do 6175do	3270do 3290do
0600	0700		Netherlands, Radio	9700pa	
0600	0700		Nigeria, Radio/Ibadan	6050do	
0600	0700		Nigeria, Radio/Kaduna	4770do	6090do
0600	0700		Nigeria, Radio/Lagos	3326do	4990do
0600	0700	vl	Papua New Guinea, Wantok R.Light	7120va	
0600	0700		Russia, Voice of	17635oc	21790oc
0600	0700	irreg/ vl	Sierra Leone, SLBS3316do		
0600	0700		Singapore, MediaCorp Radio	6150do	
0600	0700	vl	Solomon Islands, SIBC	5020do	9545do
0600	0700		Swaziland, TWR	3200af	9500af
0600	0700	as	UK, BBC World Service	17885af	
0600	0700		UK, BBC World Service	6195eu 9410eu 11955as 12095eu 15310as 15360as 15565eu 15575me 21660as	17790as
0600	0700		USA, American Forces Radio	4319usb 5446usb	
			5765usb 6350usb 10320usb 12133usb 13855usb	7590usb 12579usb 13362usb	
0600	0700		USA, KAIJ Dallas TX	5755na	
0600	0700		USA, KTBN Salt Lake City UT	7505na	
0600	0700		USA, KWHR Naalehu HI	11565as	13650as
0600	0700		USA, Voice of America	6080af 6180af	
			7405af 12080af	15580af	
0600	0700		USA, WBCQ Kennebunk ME	5110na	7415na
0600	0700		USA, WBOH Newport NC	5920am	
0600	0700		USA, WERN Birmingham AL	5050va	7570va
0600	0700		USA, WHRA Greenbush ME	5860na	7490na
0600	0700		USA, WHRI Noblesville IN	7315am	7465am
0600	0700	mtwhfa	USA, WMLK Bethel PA	9265eu	
0600	0700	s	USA, WRMI Miami FL	9955am	
0600	0700		USA, WTJC Newport NC	9370na	
0600	0700		USA, WWCN Nashville TN	3215na	5070na
			5765na 5935na		
0600	0700		USA, WWRB Manchester TN	3185na	
0600	0700		USA, WYFR Okeechobee FL	6000va 9680va 11530va	7780va skd0606
0600	0700		Uzbekistan, Christian Vision	13685as	
0600	0700	vl	Vanuatu, Radio	4960do	
0600	0700		Yemen, Rep of Yemen Radio	9780me	
0600	0700		Zambia, Christian Voice	6065af	
0600	0700	vl	Zimbabwe, ZBC Corp	5975do	
0630	0645		Vatican City, Vatican Radio	4005eu 5885eu 6185eu 7250eu 9645eu	11740eu
			15595va		
0630	0645		Vatican City, Vatican Radio	15595va	
0630	0656		Romania, Radio Romania Intl	9655va	11830va
			15440va 17770va		
0630	0700		Bulgaria, Radio	9500eu	11500eu
0630	0700		Nigeria, Voice of	15120af	
0630	0700		UK, BBC World Service	6005af 6190af	
			9410af 9530af 11765af	11940af	

0630	0700		11990af 12095af 17640af		
			Vatican City, Vatican Radio	11625af	13765af
			15570af 15595af		
0645	0700	s	Albania, TWR Europe	11865eu	
0645	0700	s	Monaco, TWR	9800eu	
0659	0700		New Zealand, Radio NZ Intl	7145pa	
0659	0700	DRM	New Zealand, Radio NZ Intl	6095pa	

0700 UTC - 3AM EDT / 2AM CDT / 12AM PDT

0700	0715		UK, BBC World Service	6005af	6190af
			11940af 11765af 17640af 17830af	15400af	15485af
0700	0727		Czech Rep, Radio Prague	9880eu	11600eu
0700	0745		USA, WYFR Okeechobee FL	7780va	
0700	0800	smtwhf	Albania, TWR Europe	11865eu	
0700	0800		Anguilla, University Network	6090am	
0700	0800		Australia, ABC NT Alice Springs	4835do	2310irr
0700	0800		Australia, ABC NT Katherine	5025do	
0700	0800		Australia, ABC NT Tennant Creek	4910do	
0700	0800		Australia, CVC International	15335as	
0700	0800		Australia, HCJB	11750as	
0700	0800		Australia, Radio	9660pa 9710pa 13630pa 15160pa 17750as	12080pa 15415va
0700	0800		Canada, CFRX Toronto ON	6070na	
0700	0800		Canada, CFVP Calgary AB	6030na	
0700	0800		Canada, CKZN St John's NF	6160na	
0700	0800		Canada, CKZU Vancouver BC	6160na	
0700	0800		China, China Radio Intl	11880as	13710eu
			15350as 15465as	17490eu	
0700	0800		Costa Rica, University Network	6150va 7375va 9725va	5030va 11870va
0700	0800		France, Radio France Intl	17800af	
0700	0800		Germany, CVC The Voice Africa	15640af	9555af
0700	0800		Germany, CVC The Voice Africa	15640af	9555af
0700	0800		Germany, Deutsche Welle	6140eu	
0700	0800	vl	Ghana, Ghana BC Corp	3366do	4915do
0700	0800		Guyana, Voice of	3291do	5950do
0700	0800		Italy, IRRS	13840va	
0700	0800		Liberia, ELWA	4760do	
0700	0800		Liberia, Star Radio	9525af	
0700	0800		Malaysia, RTM/Trax FM	7295as	
0700	0800		Malaysia, Voice of	6175as	9750as 15295as
0700	0800		Monaco, TWR	9800eu	11865eu
0700	0800		Myanmar, Radio	9730do	
0700	0800	vl	Namibia, Namibian BC Corp	6060do 6175do	3270do 3290do
0700	0800		Netherlands, Radio	9700pa	
0700	0800		New Zealand, Radio NZ Intl	7145pa	
0700	0800	DRM	New Zealand, Radio NZ Intl	6095pa	
0700	0800		Nigeria, Radio/Ibadan	6050do	
0700	0800		Nigeria, Radio/Kaduna	4770do	6090do
0700	0800		Nigeria, Radio/Lagos	3326do	4990do
0700	0800	vl	Papua New Guinea, Wantok R.Light	7120va	
0700	0800		Russia, Voice of	17495oc	21790oc
0700	0800	irreg/ vl	Sierra Leone, SLBS3316do		
0700	0800		Singapore, MediaCorp Radio	6150do	
0700	0800	vl	Solomon Islands, SIBC	5020do	9545do
0700	0800		Swaziland, TWR	6120af	9500af
0700	0800		Taiwan, Radio Taiwan Intl	9590na	
0700	0800		UK, BBC World Service	11955as 15310as 15575me 17760va 17790as 21660as	17885as
0700	0800	as	UK, Bible Voice	5945eu	
0700	0800		USA, American Forces Radio	4319usb 5446usb	
			5765usb 6350usb 10320usb 12133usb 13855usb	7590usb 12579usb 13362usb	
0700	0800		USA, KAIJ Dallas TX	5755na	
0700	0800		USA, KTBN Salt Lake City UT	7505na	
0700	0800		USA, KWHR Naalehu HI	11565as	13650as
0700	0800		USA, WBCQ Kennebunk ME	5110na	7415na
0700	0800		USA, WBOH Newport NC	5920am	
0700	0800		USA, WERN Birmingham AL	5050va	7570va
0700	0800		USA, WHRA Greenbush ME	5860na	7490na
0700	0800		USA, WHRI Noblesville IN	7315am	7495am
0700	0800	mtwhfa	USA, WMLK Bethel PA	9265eu	
0700	0800		USA, WTJC Newport NC	9370na	
0700	0800		USA, WWCN Nashville TN	3215na	5070na
			5765na 5935na		
0700	0800		USA, WWRB Manchester TN	3185na	
0700	0800		USA, WYFR Okeechobee FL	6000va 9680va 11530va	7780va 7495am
0700	0800		Vanuatu, Radio	4960do	
0700	0800	vl	Zambia, Christian Voice	6065af	
0715	0745	s	Monaco, TWR	9800eu	11865eu
0715	0750	a	Albania, TWR Europe	11865eu	
0715	0750	a	Monaco, TWR	9800eu	11865eu
0715	0800	f	UK, Bible Voice	5945eu	
0730	0800	as	Guam, TWR/KTWR	17665as	
0730	0800		Pakistan, Radio	15100eu	17835eu

0730	0800	UK, BBC World Service	6190af	11765af
		11940af	15400af	15485af
		17830af		17640af
0740	0800	mtwhf	Guam, TWR/KTWR17665as	

0800 UTC - 4AM EDT / 3AM CDT / 1AM PDT

0800	0820	smtwhf	Albania, TWR Europe	11865eu	
0800	0820		Monaco, TWR	9800eu	11865eu
0800	0830		Australia, ABC NT Katherine	5025do	
0800	0830		Australia, ABC NT Tennant Creek		4910do
0800	0830		Liberia, ELWA	4760do	
0800	0830		Malaysia, Voice of	6175as	9750as
0800	0830		Myanmar, Radio	9730do	
0800	0830		Pakistan, Radio	15100eu	17835eu
0800	0830	f	UK, Bible Voice	5945eu	
0800	0830		Vatican City, Vatican Radio	9625na	
0800	0845	as	UK, Bible Voice	5945eu	
0800	0845		USA, WYFR Okeechobee FL	5950va	9930va
0800	0900		Anguilla, University Network	6090am	
0800	0900		Australia, ABC NT Alice Springs		2310irr
			4835do		
0800	0900		Australia, CVC International	15335as	
0800	0900		Australia, HCJB	11750as	
0800	0900		Australia, Radio	5995pa	9580pa 9590pa
			9710pa	12080pa	15240va
			1541va	17750as	
0800	0900		Bhutan, BBS	6035as	
0800	0900	DRM	Bulgaria, World Radio Network		13865 ei
0800	0900		Canada, CFRX Toronto ON	6070na	
0800	0900		Canada, CFVP Calgary AB	6030na	
0800	0900		Canada, CKZN St John's NF	6160na	
0800	0900		Canada, CKZU Vancouver BC	6160na	
0800	0900		China, China Radio Intl	11880as	13710eu
			15350as	15465as	17540as
0800	0900		Costa Rica, University Network		5030va
			6150va	7375va	9725va 11870va
0800	0900		Germany, CVC The Voice Africa		9555af
			15640af		
0800	0900		Germany, Deutsche Welle	6140eu	
0800	0900	DRM	Germany, Deutsche Welle	21820af	
0800	0900	vi	Ghana, Ghana BC Corp	3366do	4915do
0800	0900		Guam, TWR/KTWR11840as	17665as	
0800	0900		Guyana, Voice of	3291do	5950do
0800	0900		Indonesia, Voice of	9525as	11785pa
			15150al		
0800	0900		Italy, IRRS	13840va	
0800	0900		Liberia, Star Radio	9525af	
0800	0900		Malaysia, RTM/Trax FM		7295as
0800	0900		Malaysia, Voice of	15295as	
0800	0900		New Zealand, Radio NZ Intl	6095pa	
0800	0900	DRM	New Zealand, Radio NZ Intl	6095pa	
0800	0900		Nigeria, Radio/Ibadan	6050do	
0800	0900		Nigeria, Radio/Kaduna	4770do	6090do
0800	0900		Nigeria, Radio/Lagos	3326do	4990do
0800	0900		Papua New Guinea, Catholic Radio		4960do
0800	0900		Papua New Guinea, NBC	4890do	
0800	0900	vi	Papua New Guinea, Wantok R.Light		7120va
0800	0900		Russia, Voice of	17495oc	17635oc
0800	0900	DRM	Russia, Voice of	15780eu	
0800	0900	irreg/ vi	Sierra Leone, SLBS3316do		
0800	0900		Singapore, MediaCorp Radio	6150do	
0800	0900	vi	Solomon Islands, SIBC	5020do	9545do
0800	0900		South Korea, KBS World Radio		9570as
			9640eu		
0800	0900		Swaziland, TWR	6120af	9500af
0800	0900		Taiwan, Radio Taiwan Intl		9610as
0800	0900		UK, BBC World Service	6190af	6195as
			9740as	11760me	11940af 15310as
			15360as	15400af	15485af 15575me
			17640af	17760as	17790as 17830af
			17885af	21470af	21660as
0800	0900		USA, American Forces Radio	4319usb	5446usb
			5765usb	6350usb	7590usb 7812usb
			10320usb	12133usb	12579usb 13362usb
			13855usb		
0800	0900		USA, KAIJ Dallas TX	5755na	
0800	0900		USA, KNLS Anchor Point AK	11765as	
0800	0900		USA, KTNB Salt Lake City UT	7505na	
0800	0900		USA, KWHR Naalehu HI	9930as	11565as
0800	0900		USA, WBOH Newport NC	5920am	
0800	0900		USA, WEWN Birmingham AL	5050na	7570na
0800	0900		USA, WHRA Greenbush ME	5860na	7490na
0800	0900		USA, WHRI Noblesville IN	7315am	7495am
0800	0900		USA, WTJC Newport NC	9370na	
0800	0900		USA, WWCN Nashville TN	3215na	5070na
			5765na	5935na	
0800	0900		USA, WWRB Manchester TN	3185na	
0800	0900		USA, WYFR Okeechobee FL	5985va	6855va
0800	0900	vi	Vanuatu, Radio	4960do	
0800	0900		Zambia, Christian Voice	6065af	
0815	0900	as	Guam, TWR/KTWR11840as		
0830	0900		Australia, ABC NT Katherine	2485do	
0830	0900		Australia, ABC NT Tennant Creek		2325do
0845	0900	f	UK, Bible Voice	17595va	

0900 UTC - 5AM EDT / 4AM CDT / 2AM PDT

0900	0900		USA, WBCQ Kennebunk ME	5110na	7415na
0900	0915	vi	Ghana, Ghana BC Corp	3366do	4915do
0900	0927		Czech Rep, Radio Prague	9880eu	21745va
0900	0930	as	Guam, TWR/KTWR11840as		
0900	1000		Anguilla, University Network	6090am	
0900	1000		Australia, ABC NT Alice Springs		2310do
			4835irr		
0900	1000		Australia, ABC NT Katherine	2485do	
0900	1000		Australia, ABC NT Tennant Creek		2325do
0900	1000		Australia, CVC International	11955as	
0900	1000		Australia, Radio	9580pa	9590pa 11880as
			15240as	15415va	
0900	1000	DRM	Bulgaria, World Radio Network		13865eu
0900	1000		Canada, CFRX Toronto ON	6070na	
0900	1000		Canada, CFVP Calgary AB	6030na	
0900	1000		Canada, CKZN St John's NF	6160na	
0900	1000		Canada, CKZU Vancouver BC	6160na	
0900	1000		China, China Radio Intl	15210oc	17490eu
			17690oc		
0900	1000		Costa Rica, University Network		5030va
			6150va	7375va	9725va 11870va
			13750va		
0900	1000		Germany, CVC The Voice Africa		9555af
0900	1000		Germany, Deutsche Welle	6140eu	
0900	1000	DRM	Germany, Deutsche Welle	21820af	
0900	1000		Germany, Overcomer Ministries		6110eu
			13810eu		
0900	1000		Guyana, Voice of	3291do	5950do
0900	1000		Italy, IRRS	13840va	
0900	1000		Malaysia, RTM/Trax FM		7295as
0900	1000		Malaysia, Voice of	15295as	
0900	1000	vi	Namibia, Namibian BC Corp	3270do	3290do
			6060do	6175do	
0900	1000		New Zealand, Radio NZ Intl	6095pa	
0900	1000	DRM	New Zealand, Radio NZ Intl	6095pa	
0900	1000		Nigeria, Radio/Ibadan	6050do	
0900	1000		Nigeria, Radio/Kaduna	4770do	6090do
0900	1000		Nigeria, Radio/Lagos	3326do	4990do
0900	1000		Papua New Guinea, Catholic Radio		4960do
0900	1000		Papua New Guinea, NBC	4890do	
0900	1000	vi	Papua New Guinea, Wantok R.Light		7120va
0900	1000	vi	Rwanda, Radio	6055do	
0900	1000	irreg/ vi	Sierra Leone, SLBS3316do		
0900	1000		Singapore, MediaCorp Radio	6150do	
0900	1000	vi	Solomon Islands, SIBC	5020do	9545do
0900	1000		UK, BBC World Service	6190af	6195as
			9605as	9740as	11940af 15310as
			15360as	15400af	15485af 17640af
			17760as	17830af	17885af 21470af
0900	1000	f	UK, Bible Voice	17595va	
0900	1000		USA, American Forces Radio	4319usb	5446usb
			5765usb	6350usb	7590usb 7812usb
			10320usb	12133usb	12579usb 13362usb
			13855usb		
0900	1000		USA, KAIJ Dallas TX	5755na	
0900	1000		USA, KTNB Salt Lake City UT	7505na	
0900	1000		USA, KWHR Naalehu HI	9930as	11565as
0900	1000		USA, WBCQ Kennebunk ME	5110na	7415na
0900	1000		USA, WBOH Newport NC	5920am	
0900	1000		USA, WEWN Birmingham AL	5050na	
0900	1000		USA, WHRI Noblesville IN	7315am	7520am
0900	1000		USA, WTJC Newport NC	9370na	
0900	1000		USA, WWCN Nashville TN	5070na	5765na
			5935na	9985na	
0900	1000		USA, WWRB Manchester TN	3185na	
0900	1000		USA, WYFR Okeechobee FL	5985va	6885va
			9755va		
0900	1000	vi	Vanuatu, Radio	4960do	
0900	1000		Zambia, Christian Voice	6065af	
0905	1000	s	Greece, Voice of	9420eu	12120eu 15630eu
0930	0945		Israel, Kol Israel	13680eu	15760eu

1000 UTC - 6AM EDT / 5AM CDT / 3AM PDT

1000	1015	f	UK, Bible Voice	17595va	
1000	1015	as	USA, WRMI Miami FL	9955am	
1000	1025	DRM	Germany, Deutsche Welle	21820af	
1000	1030		Mongolia, Voice of	12085as	
1000	1030		UK, BBC World Service	6195as	9690as
			9740as	15310as	15360as 17760as
			17790as	21660as	
1000	1059		New Zealand, Radio NZ Intl	6095pa	
1000	1100		Anguilla, University Network	11775am	
1000	1100		Australia, ABC NT Alice Springs		2310do
			4835irr		
1000	1100		Australia, ABC NT Katherine	2485do	
1000	1100		Australia, ABC NT Tennant Creek		2325do
1000	1100		Australia, CVC International	11955as	
1000	1100		Australia, HCJB	15400as	15540as
1000	1100		Australia, Radio	9580pa	9590pa 11880as
			15240as	15415va	

1000	1100	DRM	Bulgaria, World Radio Network	13865eu	
1000	1100		Canada, CFRX Toronto ON	6070na	
1000	1100		Canada, CFVP Calgary AB	6030na	
1000	1100		Canada, CKZN St John's NF	6160na	
1000	1100		Canada, CKZU Vancouver BC	6160na	
1000	1100		China, China Radio Intl	6040na	17490eu
1000	1100		Costa Rica, University Network	5030va	
			6150va 7375va	9725va	11870va
			13750va		
1000	1100		Germany, CVC The Voice Africa	9555af	
1000	1100		Germany, Overcomer Ministries	6110eu	
			13810eu		
1000	1100		Guyana, Voice of	3291do	5950do
1000	1100		India, All India Radio	13695oc	15020as
			15410as 17510as	17800as	17895oc
1000	1100		Italy, IRRS	13840va	
1000	1100		Japan, Radio Japan/NHK World	6120na	
			9695as 11730as	17585va	17720me
			21755oc		
1000	1100		Malaysia, RTM/Trax FM	7295as	
1000	1100		Malaysia, Voice of 15295as		
1000	1100		Netherlands, Radio	12065as	13710as
			13820as		
1000	1100	DRM	Netherlands, Radio	7240eu	
1000	1100	DRM	New Zealand, Radio NZ Intl	6095pa	
1000	1100		Nigeria, Voice of	7255af	
1000	1100		North Korea, Voice of Korea	6185as	6285am
			9335ca 9850as		
1000	1100		Papua New Guinea, Catholic Radio	4960do	
1000	1100		Papua New Guinea, NBC	4890do	
1000	1100	vl	Papua New Guinea, Wantok R.Light	7120va	
1000	1100		Singapore, MediaCorp Radio	6150do	
1000	1100	vl	Solomon Islands, SIBC	5020do	9545do
1000	1100		South Africa, Channel Africa	9620af	
1000	1100		UK, BBC World Service	6190af	11940af
			15485af 15575me		
1000	1100	as	UK, BBC World Service	15400af	
1000	1100		USA, American Forces Radio	4319usb	5446usb
			5765usb 6350usb	7590usb	7812usb
			10320usb 12133usb	12579usb	13362usb
			13855usb		
1000	1100		USA, KAIJ Dallas TX	5755na	
1000	1100		USA, KNLS Anchor Point AK	9795as	
1000	1100		USA, KTNB Salt Lake City UT	7505na	
1000	1100		USA, KWHR Naalehu HI	9930as	11565as
1000	1100		USA, WBCQ Kennebunk ME	5110na	7415na
1000	1100		USA, WBOH Newport NC	5920am	
1000	1100		USA, WEWN Birmingham AL	5050na	
1000	1100		USA, WHRI Noblesville IN	7520am	7555am
1000	1100		USA, WINB Red Lion PA	9265am	
1000	1100		USA, WTJC Newport NC	9370na	
1000	1100		USA, WWCN Nashville TN	5070na	5765na
			5935na 15825na		
1000	1100		USA, WWRB Manchester TN	3185na	
1000	1100		USA, WYFR Okeechobee FL	5950va	5985va
			6855va 9755va		
1000	1100		Zambia, Christian Voice	6065af	
1030	1045	mtwhf	Ethiopia, Radio	5990af	9704af
1030	1057		Czech Rep, Radio Prague	9880eu	11665va
1030	1058		Vietnam, Voice of	7285as	
1030	1100		Iran, Voice of the Islamic Rep	15600as	17660as
1030	1100		UK, BBC World Service	6195as	9740as
			15310as 17760as	17790as	
1059	1100		New Zealand, Radio NZ Intl	9870pa	

1100 UTC - 7AM EDT / 6AM CDT / 4AM PDT

1100	1128		Vietnam, Voice of	9840as	7220as	7285as
1100	1130		Australia, HCJB	15540as		
1100	1130		Australia, Radio	5995pa	9475va	9590va
			9580pa 9590pa	11880va	15240va	
1100	1130		Iran, Voice of the Islamic Rep	15600as	17660as	
1100	1130		UK, BBC World Service	6190af	11940af	
			15400af 15485af	17640af	17830af	
			17885af 21470af			
1100	1145		USA, WYFR Okeechobee FL	9550va	9755va	
1100	1159	s	Germany, Universal Life	6055me		
1100	1200		Anguilla, University Network	11775am		
1100	1200		Australia, ABC NT Alice Springs	4835irr	2310do	
			4835irr			
1100	1200		Australia, ABC NT Katherine	2485do		
1100	1200		Australia, ABC NT Tennant Creek	2325do		
1100	1200		Australia, CVC International	13635as		
1100	1200	DRM	Bulgaria, World Radio Network	13865eu		
1100	1200	as	Canada, CBC NQ SW Service	9625na		
1100	1200		Canada, CFRX Toronto ON	6070na		
1100	1200		Canada, CFVP Calgary AB	6030na		
1100	1200		Canada, CKZN St John's NF	6160na		
1100	1200		Canada, CKZU Vancouver BC	6160na		
1100	1200		China, China Radio Intl	6040na	11750na	
			13650eu 17490eu			
1100	1200		Costa Rica, University Network	5030va		
			6150va 7375va	9725va	11870va	
			13750va			
1100	1200		Germany, CVC The Voice Africa	9555af		

1100	1200	1st a	Germany, Overcomer Ministries	6110eu	
1100	1200		Italy, IRRS	13840va	
1100	1200		Japan, Radio Japan/NHK World	6120na	
			9695as 11730as		
1100	1200	vl	Libya, Voice of Africa	17725af	21695af
1100	1200		Malaysia, RTM/Trax FM	7295as	
1100	1200		Malaysia, Voice of 15295as		
1100	1200		Netherlands, Radio	11675na	
1100	1200		New Zealand, Radio NZ Intl	9870pa	
1100	1200	DRM	New Zealand, Radio NZ Intl	6095pa	
1100	1200		Nigeria, Voice of	7255af	
1100	1200		Papua New Guinea, Catholic Radio	4960do	
1100	1200		Papua New Guinea, NBC	4890do	
1100	1200	vl	Papua New Guinea, Wantok R.Light	7120va	
1100	1200		Singapore, Radio Singapore Intl	6080as	
			6150as		
1100	1200		South Africa, Channel Africa	9620af	
1100	1200		Taiwan, Radio Taiwan Intl	7445as	
1100	1200		UK, BBC World Service	6195as	9740as
			11865va 15310as	15575me	17760as
			17790as		
1100	1200		Ukraine, Radio Ukraine Intl	15675eu	
1100	1200		USA, American Forces Radio	4319usb	5446usb
			5765usb 6350usb	7590usb	7812usb
			10320usb 12133usb	12579usb	13362usb
			13855usb		
1100	1200		USA, KAIJ Dallas TX	5755na	
1100	1200		USA, KTNB Salt Lake City UT	7505na	
1100	1200		USA, KWHR Naalehu HI	9930as	11565as
1100	1200		USA, Voice of America	15205va	
1100	1200		USA, WBOH Newport NC	5920am	
1100	1200		USA, WEWN Birmingham AL	5050na	
1100	1200		USA, WHRI Noblesville IN	7520am	7555am
1100	1200		USA, WINB Red Lion PA	9265am	
1100	1200		USA, WTJC Newport NC	9370na	
1100	1200		USA, WWCN Nashville TN	5070na	5935na
			7465na 15825na		
1100	1200		USA, WWRB Manchester TN	3185na	
1100	1200		USA, WWRB Manchester TN	3185na	
1100	1200		USA, WYFR Okeechobee FL	5950va	5985va
			7780va 9625va		
1100	1200		Zambia, Christian Voice	6065af	
1115	1200	s	USA, WRMI Miami FL	9955am	
1130	1159	a	Germany, Universal Life	6055me	
1130	1200	mtwhf	Australia, HCJB	15425as	
1130	1200		Australia, Radio	5995pa	9475va
			9580pa 9590pa	11880va	9590va
1130	1200		Bulgaria, Radio	11700eu	
1130	1200		Guam, AWR/KSDA	15435as	
1130	1200		UK, BBC World Service	6190af	11940af
			15485af 17640af	17830af	17885af
			21470af		
1130	1200		Vatican City, Vatican Radio	15595va	17515va

1200 UTC - 8AM EDT / 7AM CDT / 5AM PDT

1200	1215	vl	Cambodia, National Radio	11940as	
1200	1230		France, Radio France Intl	17815af	21620af
1200	1230		Malaysia, Voice of 15295as		
1200	1230		UAE, AWR Africa	15140as	15365as
1200	1245		USA, WYFR Okeechobee FL	5950am	5985am
1200	1259		Canada, Radio Canada Intl	9660as	15170as
1200	1259		New Zealand, Radio NZ Intl	9870pa	
1200	1259		Poland, Radio Polonia	9525eu	11850eu
1200	1300		Anguilla, University Network	11775am	
1200	1300		Australia, ABC NT Alice Springs	4835irr	2310do
			4835irr		
1200	1300		Australia, ABC NT Katherine	2485do	
1200	1300		Australia, ABC NT Tennant Creek	2325do	
1200	1300		Australia, CVC International	13635as	
1200	1300		Australia, Radio	5995pa	9475va
			9580pa 9590pa	11880va	9590va
1200	1300	DRM	Bulgaria, World Radio Network	13865eu	
1200	1300	as	Canada, CBC NQ SW Service	9625na	
1200	1300		Canada, CFRX Toronto ON	6070na	
1200	1300		Canada, CFVP Calgary AB	6030na	
1200	1300		Canada, CKZN St John's NF	6160na	
1200	1300		Canada, CKZU Vancouver BC	6160na	
1200	1300		China, China Radio Intl	6040na	11750na
			13650eu 17490eu		
1200	1300		Costa Rica, University Network	5030va	
			6150va 7375va	9725va	11870va
			13750va		
1200	1300		Germany, CVC International	17860as	
1200	1300		Germany, CVC The Voice Africa	9555af	
1200	1300		Germany, Overcomer Ministries	6110eu	
			13810eu		
1200	1300	fas	Italy, IRRS	15740as	
1200	1300		Italy, IRRS	13840va	
1200	1300	vl	Libya, Voice of Africa	17670af	17675af
			17680af 21695af		
1200	1300		Malaysia, RTM/Trax FM	7295as	
1200	1300		Malaysia, Voice of 6175as		
1200	1300	DRM	Netherlands, Radio	7240eu	
1200	1300	DRM	New Zealand, Radio NZ Intl	6095pa	

1200	1300	Nigeria, Voice of	7255af	
1200	1300	Papua New Guinea, Catholic Radio	4960do	
1200	1300	Papua New Guinea, NBC	4890do	
1200	1300	Papua New Guinea, Wantok R.Light	7120va	
1200	1300	Singapore, Radio Singapore Intl	6080as	
		6150as		
1200	1300	South Korea, KBS World Radio	9650na	
1200	1300	Taiwan, Radio Taiwan Intl	7130na	
1200	1300	UK, BBC World Service	6190af	6195as
		9740as	11865va	11940af 15310as
		15485af	15575me	17640af 17760as
		17790as	17830af	17885af 21470af
1200	1300	USA, American Forces Radio	4319usb	5446usb
		5765usb	6350usb	7590usb 7812usb
		10320usb	12133usb	12579usb 13362usb
		13855usb		
1200	1300	USA, KALJ Dallas TX	5755na	
1200	1300	USA, KNLS Anchor Point AK	6151as	9780as
1200	1300	USA, KTNB Salt Lake City UT	7505na	
1200	1300	USA, KWHR Naalehu HI	11565as	12130as
1200	1300	USA, Voice of America	6160va	9645va
		9760va	11750va	
1200	1300	USA, WBOH Newport NC	5920am	
1200	1300	USA, WEWN Birmingham AL	5050na	
1200	1300	USA, WHRA Greenbush ME	15665na	
1200	1300	USA, WHRI Noblesville IN	9495am	9840am
		12050am		
1200	1300	USA, WINB Red Lion PA	13570am	
1200	1300	USA, WTJC Newport NC	9370na	
1200	1300	USA, WWCR Nashville TN	7465na	9985na
		13845na	15825na	
1200	1300	USA, WWRB Manchester TN	3185na	
1200	1300	USA, WYFR Okeechobee FL	17555am	17750am
1200	1300	Zambia, Christian Voice	6065af	
1205	1220	m	Austria, Radio Austria Intl	6155eu 13730eu
		17715as		
1205	1230	as	Austria, Radio Austria Intl	6155eu 13730eu
		17715va		
1215	1230	twhf	Austria, Radio Austria Intl	17715va
1215	1300		Egypt, Radio Cairo	17835as
1230	1258		Vietnam, Voice of	9840as 12020as
1230	1300		Bangladesh, Bangla Betar	7185as
1230	1300		Sweden, Radio	13580va 15240na 15735va
1230	1300		Thailand, Radio	9835va
1230	1300		Turkey, Voice of	15450eu 15535va
1235	1300	as	Austria, Radio Austria Intl	6155eu 13730eu
		17715va		
1245	1300	twf	Austria, Radio Austria Intl	6155eu 13730eu
		17715va		
1255	1258		Finland, YLE/Radio Finland	13715do 15400do

1300 UTC - 9AM EDT / 8AM CDT / 6AM PDT

1300	1315	w	Australia, HCJB	15405as	
1300	1320		Turkey, Voice of	15450eu	15535va
1300	1327		Czech Rep, Radio Prague	13580as	17540na
1300	1330		Australia, HCJB	15400as	
1300	1330		Egypt, Radio Cairo	17835as	
1300	1330	DRM	Netherlands, Radio	7240eu	
1300	1356		Romania, Radio Romania Intl	11845eu	15105eu
1300	1400		Anguilla, University Network	11775am	
1300	1400		Australia, CVC International	13635as	
1300	1400		Australia, Radio	5995pa	6020pa 9560pa
			9580pa	9590pa	
1300	1400	DRM	Bulgaria, World Radio Network		13865eu
1300	1400	as	Canada, CBC NQ SW Service	9625na	
1300	1400		Canada, CFRX Toronto ON	6070na	
1300	1400		Canada, CFVP Calgary AB	6030na	
1300	1400		Canada, CKZN St John's NF	6160na	
1300	1400		Canada, CKZU Vancouver BC	6160na	
1300	1400		Canada, Radio Canada Intl	9515am	13655am
			17800am		
1300	1400		China, China Radio Intl	9570na	9650pa
			11760oc	11900oc	11980as 13790eu
			15260na	17490eu	
1300	1400		Costa Rica, University Network		9725va
			11870va	13750va	
1300	1400		Germany, CVC International	17860as	
1300	1400		Germany, CVC The Voice Africa		9555af
1300	1400		Germany, Deutsche Welle	6140eu	
1300	1400		Germany, Overcomer Ministries		6110eu
			13810eu		
1300	1400	as	Italy, IRRS	13840va	
1300	1400	mtwhf	Italy, IRRS	15740va	
1300	1400		Jordan, Radio	11690na	
1300	1400	vl	Libya, Voice of Africa	17690af	17675af
			17680af	21695af	
1300	1400		Malaysia, RTM/Trax FM	7295as	
1300	1400		Malaysia, Voice of	6175as	
1300	1400		New Zealand, Radio NZ Intl	7145pa	
1300	1400	DRM	New Zealand, Radio NZ Intl	6095pa	
1300	1400		Nigeria, Voice of	7255af	
1300	1400		North Korea, Voice of Korea	7570eu	9335na
			11710na	12015eu	13760eu
1300	1400		Papua New Guinea, Catholic Radio	4960do	

1300	1400	Papua New Guinea, NBC	4890do	
1300	1400	Papua New Guinea, Wantok R.Light		7120va
1300	1400	Singapore, Radio Singapore Intl		6080as
		6150as		
1300	1400	South Korea, KBS World Radio		9570na
		9770na		
1300	1400	UK, BBC World Service	6190af	6195as
		9740as	11760me	11940af 12095eu
		15310as	15420af	15485af 15565eu
		15575me	17640va	17760as 17790as
		17830af	17885af	21470af
1300	1400	USA, American Forces Radio	4319usb	5446usb
		5765usb	6350usb	7590usb 7812usb
		10320usb	12133usb	12579usb 13362usb
		13855usb		
1300	1400	USA, KALJ Dallas TX	5755na	
1300	1400	USA, KTNB Salt Lake City UT	7505na	
1300	1400	USA, KWHR Naalehu HI	12130as	
1300	1400	USA, Voice of America	9645va	9760va
1300	1400	USA, WBCQ Kennebunk ME	9330na	
1300	1400	USA, WBOH Newport NC	5920am	
1300	1400	USA, WEWN Birmingham AL	5050na	
1300	1400	USA, WHRA Greenbush ME	15665na	
1300	1400	USA, WHRI Noblesville IN	9840am	11785am
		12050am		
1300	1400	USA, WINB Red Lion PA	13570am	
1300	1400	USA, WTJC Newport NC	9370na	
1300	1400	USA, WWCR Nashville TN	7465na	9985na
		13845na	15825na	
1300	1400	USA, WWRB Manchester TN	9385na	
1300	1400	USA, WYFR Okeechobee FL	11520va	11560va
		11830va	11865va	11910va 17750va
1300	1400	s	Zambia, Christian Voice	6065af
1330	1400	twfha	Australia, HCJB	15435as
1330	1400		Guam, AWR/KSDA	15275as
1330	1400		Guam, TWR/KTWR9585as	
1330	1400		India, All India Radio	9690as 11620as
			13710as	
1330	1400		Laos, National Radio	7145as
1330	1400		Sweden, Radio	15240na 15735va

1400 UTC - 10AM EDT / 9AM CDT / 7AM PDT

1400	1415	th	Germany, Pan American BC	15205me	
1400	1415		Russia, FEBA	9500as	
1400	1430		Australia, Radio	5995pa	6080pa 7420va
			9590pa	11750as	
1400	1430	DRM	Canada, Radio Canada Intl		9815eu
1400	1430		Thailand, Radio	9830va	
1400	1500		Anguilla, University Network		11775am
1400	1500		Australia, CVC International		13635as
1400	1500	DRM	Bulgaria, World Radio Network		11540eu
1400	1500	as	Canada, CBC NQ SW Service	9625na	
1400	1500		Canada, CFRX Toronto ON	6070na	
1400	1500		Canada, CFVP Calgary AB	6030na	
1400	1500		Canada, CKZN St John's NF	6160na	
1400	1500		Canada, CKZU Vancouver BC	6160na	
1400	1500		Canada, Radio Canada Intl	9515am	13655am
			17800am		
1400	1500		China, China Radio Intl	6100af	9560as
			11675as	11765as	11775as 13685af
			13710na	13740na	13790na 17490eu
			17650eu		
1400	1500		Costa Rica, University Network		9725va
			11870va	13750va	
1400	1500		France, Radio France Intl	21620as	
1400	1500		Germany, CVC International	15795as	
1400	1500		Germany, CVC The Voice Africa		9555af
1400	1500		Germany, Deutsche Welle	6140eu	
1400	1500		Germany, Overcomer Ministries		13810va
1400	1500	a	Greece, Voice of	9420va	9775va 12105va
			15630va		
1400	1500		Guam, TWR/KTWR9975as		
1400	1500		India, All India Radio	9690as	11620as
			13710as		
1400	1500		Italy, IRRS	9310va	
1400	1500	as	Italy, IRRS	13840va	
1400	1500		Japan, Radio Japan/NHK World		7200as
			11730as	11840oc	
1400	1500		Jordan, Radio	11690na	
1400	1500		Libya, Voice of Africa		17725af 17850af
1400	1500		Malaysia, RTM/Trax FM	7295as	
1400	1500		Malaysia, Voice of	6175as	
1400	1500		Netherlands, Radio		9345as 9890as
			11835as		
1400	1500		New Zealand, Radio NZ Intl	7145pa	
1400	1500	DRM	New Zealand, Radio NZ Intl	6095pa	
1400	1500		Nigeria, Voice of	7255af	
1400	1500		Oman, Radio Oman		15140as
1400	1500	vl	Papua New Guinea, Wantok R.Light		7120va
1400	1500		Russia, Voice of	7165eu	9745as
			11755as	12055as	15605as 17645as
1400	1500		Singapore, MediaCorp Radio	6150do	
1400	1500		South Africa, Channel Africa	9620af	
1400	1500		Taiwan, Radio Taiwan Intl	15265as	

1400	1500		UK, BBC World Service	6190af	6195as
			9740as	11940af	15310as
			15485va	15565eu	15575me
			17760as	17790as	17830af
			21660af		21470af
1400	1500	as	UK, Bible Voice	15690as	
1400	1500		USA, American Forces Radio	4319usb	5446usb
			5765usb	6350usb	7590usb
			10320usb	12133usb	12579usb
			13855usb		13362usb
1400	1500		USA, KAIJ Dallas TX	13815na	
1400	1500		USA, KJES Vado NM	11715na	
1400	1500		USA, KNLS Anchor Point AK	9795as	
1400	1500		USA, KTBN Salt Lake City UT	7505na	
1400	1500		USA, KWHR Naalehu HI	9930as	
1400	1500		USA, Voice of America	4930af	6080af
			7125va	9760va	13795af
			15490af	15580af	17720af
1400	1500		USA, WBCQ Kennebunk ME	9330na	
1400	1500		USA, WBOH Newport NC	5920am	
1400	1500		USA, WEWN Birmingham AL	9955na	
1400	1500		USA, WHRA Greenbush ME	17650na	
1400	1500		USA, WHRI Noblesville IN	9840am	11785am
			12050am		
1400	1500		USA, WINB Red Lion PA	13570am	
1400	1500		USA, WRMI Miami FL	7385am	
1400	1500		USA, WTJC Newport NC	9370na	
1400	1500		USA, WWCR Nashville TN	9985na	12160na
			13845na	15825na	
1400	1500		USA, WWRB Manchester TN	9385na	
1400	1500		USA, WYFR Okeechobee FL	11520va	11560va
			11830va	11910va	13695va
1400	1500		Zambia, Christian Voice	6065af	
1415	1430		Nepal, Radio	3230as	5005as
			7165as		6100as
1430	1445	s	Germany, Pan American BC	15205as	15650as
1430	1459	s	UK, Bible Voice	12005as	
1430	1500		Australia, Radio	5995pa	6080pa
			9475pa	9590pa	7420va
1430	1500	DRM	South Korea, KBS World Radio	11660va	11750va
					9770eu

1500 UTC - 11AM EDT / 10AM CDT / 8AM PDT

1500	1510	mtwhfa	Turkmenistan, Turkmen Radio	5015eu	
1500	1528		Vietnam, Voice of	9550va	9840va
			13860va		12020va
1500	1530	s	Hungary, Radio Budapest	6025eu	9690eu
1500	1530		Mongolia, Voice of	12015eu	
1500	1530		UK, BBC World Service	9695af	11690af
			11940af	15400af	15420af
			17640af	17830af	21470af
1500	1530	fs	UK, Bible Voice	13840as	
1500	1545		Germany, CVC The Voice Africa		9555af
			15715af		
1500	1545		Russia, FEBA	7320as	
1500	1545	a	UK, Bible Voice	15690as	
1500	1545		USA, WYFR Okeechobee FL	15770va	
1500	1555		South Africa, Channel Africa	17770af	
1500	1557		Canada, Radio Canada Intl	11675as	15360as
			17720as		
1500	1557		Libya, Voice of Africa	17725af	17850af
			21695af		
1500	1559		Canada, Radio Canada Intl	9515as	13655as
			17800as		
1500	1559		South Africa, Channel Africa	9620af	
1500	1559	w	UK, Bible Voice	15680as	
1500	1600		Anguilla, University Network	11775am	
1500	1600		Australia, CVC International	13635as	
1500	1600		Australia, Radio	5995pa	6080pa
			9475pa	9590pa	7420va
1500	1600	DRM	Bulgaria, World Radio Network		11540eu
1500	1600	as	Canada, CBC NQ SW Service	9625na	
1500	1600		Canada, CFRX Toronto ON	6070na	
1500	1600		Canada, CFVP Calgary AB	6030na	
1500	1600		Canada, CKZN St John's NF	6160na	
1500	1600		Canada, CKZU Vancouver BC	6160na	
1500	1600		China, China Radio Intl	6100af	7160as
			9785as	11965eu	13640eu
			13740na	17490eu	13685af
1500	1600		Costa Rica, University Network		9725va
			11870va	13750va	
1500	1600		France, Radio France Intl	17850af	
1500	1600		Germany, CVC International	15795as	
1500	1600		Germany, Deutsche Welle	6140eu	
1500	1600		Germany, Overcomer Ministries		13810va
1500	1600		Italy, IRRS	5785va	9310va
1500	1600	as	Italy, IRRS	13840eu	
1500	1600		Japan, Radio Japan/NHK World		6190as
			7200as	9505va	11730as
1500	1600		Jordan, Radio	11690na	
1500	1600		Malaysia, RTM/Trax FM	7295as	
1500	1600		Malaysia, Voice of	6175as	
1500	1600		Netherlands, Radio	9345as	9890as
			11835as		
1500	1600		New Zealand, Radio NZ Intl	7145pa	

1500	1600	DRM	New Zealand, Radio NZ Intl	6095pa	
1500	1600		North Korea, Voice of Korea	7570eu	9335na
			11710na	12015eu	13760eu
1500	1600	vl	Papua New Guinea, Wantok R.	Light	7120va
1500	1600		Russia, Voice of	4965me	4975me
			9660as	12040eu	15455eu
1500	1600		Singapore, MediaCorp Radio	6150do	
1500	1600		UK, BBC World Service	5975as	6195as
			9740as	11750as	12095eu
			15485eu	15565eu	15640va
1500	1600	vl/ mtwhf	UK, Sudan Radio Service	15575af	
1500	1600		USA, American Forces Radio	4319usb	5446usb
			5765usb	6350usb	7590usb
			10320usb	12133usb	12579usb
			13855usb		13362usb
1500	1600		USA, KAIJ Dallas TX	13815na	
1500	1600		USA, KJES Vado NM	11715na	
1500	1600		USA, KTBN Salt Lake City UT	7505na	
1500	1600		USA, KWHR Naalehu HI	9930as	
1500	1600		USA, Voice of America	4930af	6160va
			7125af	7405va	9590va
			12150af	13795va	15105va
			15445va	15550af	15580af
1500	1600		USA, WBCQ Kennebunk ME	9330na	
1500	1600		USA, WBOH Newport NC	5920am	
1500	1600		USA, WEWN Birmingham AL	9955na	
1500	1600		USA, WHRA Greenbush ME	17650na	
1500	1600		USA, WHRI Noblesville IN	9840am	11785am
			13760am		
1500	1600		USA, WINB Red Lion PA	13570am	
1500	1600	smtwhf	USA, WMLK Bethel PA	9265eu	
1500	1600		USA, WRMI Miami FL	7385am	
1500	1600		USA, WTJC Newport NC	9370na	
1500	1600		USA, WWCR Nashville TN	9985na	12160na
			13845na	15825na	
1500	1600		USA, WWRB Manchester TN	9385na	11915na
1500	1600		USA, WYFR Okeechobee FL	6280va	11830va
			11910va	15750af	17750va
1500	1600		Zambia, Christian Voice	4965af	
1500	1600	f DRM	Taiwan, Radio Taiwan Intl	9770eu	
1505	1520	m	Austria, Radio Austria Intl	13775am	
1505	1530	as	Austria, Radio Austria Intl	13775am	
1515	1530	thwf	Austria, Radio Austria Intl	13775am	
1530	1559	smhf	UK, Bible Voice	15680as	13840al
1530	1600		Iran, Voice of the Islamic Rep	7350as	9635as
			11650al		
1530	1600		UAE, AWR Africa	15225as	
1530	1600		UK, BBC World Service	6190af	11940af
			15400af	15485af	17640af
			21470af	21660af	17830af
1530	1600		Vatican City, Vatican Radio	12065va	13765va
			15235va		
1535	1600	as	Austria, Radio Austria Intl	13755am	
1540	1600	t	UK, Bible Voice	13590me	
1545	1600	mtwhf	Austria, Radio Austria Intl	13755am	
1545	1600	s	Germany, Pan American BC	15650me	
1545	1600	a	UK, Bible Voice	13590me	

1600 UTC - 12PM EDT / 11AM CDT / 9AM PDT

1600	1615	f	Armenia, FEBA	9850as	
1600	1615		Pakistan, Radio	9375va	11570va
			15725va		12105va
1600	1615		UK, BBC World Service	3255af	6190af
			12095af	15105af	15400af
			17830af	17885af	21470af
1600	1615	mwf	UK, Bible Voice	13590me	
1600	1627		Czech Rep, Radio Prague	5930eu	17485af
1600	1628		Vietnam, Voice of	7280va	9550va
			11630va	13860va	9730va
1600	1630	sh	Germany, Pan American BC	15650me	
1600	1630		Guam, AWR/KSDA	11640as	11680as
1600	1630		Iran, Voice of the Islamic Rep	7350as	9635as
			11650al		
1600	1630		Jordan, Radio	11690na	
1600	1630		Myanmar, Radio	9730do	
1600	1640	vl/mtwhf	Moldova, Radio Pridnestrovy	5965eu	
1600	1645	h	UK, Bible Voice	13590me	
1600	1645		USA, WYFR Okeechobee FL	11830va	11865va
			17750va		
1600	1650		New Zealand, Radio NZ Intl	7145pa	
1600	1650	DRM	New Zealand, Radio NZ Intl	6095pa	
1600	1700		Anguilla, University Network	11775am	
1600	1700		Australia, CVC International	13635as	
1600	1700		Australia, Radio	5995pa	6080pa
			9475pa	9710pa	11660as
1600	1700	DRM	Bulgaria, World Radio Network		11540eu
1600	1700	a	Canada, CBC NQ SW Service	9625na	
1600	1700		Canada, CFRX Toronto ON	6070na	
1600	1700		Canada, CFVP Calgary AB	6030na	
1600	1700		Canada, CKZN St John's NF	6160na	
1600	1700		Canada, CKZU Vancouver BC	6160na	
1600	1700		China, China Radio Intl	6100af	9570af
			11900af	11940eu	11865eu
			17490eu		13760eu

1600	1700	Costa Rica, University Network	11870va
		13750va	
1600	1700	Egypt, Radio Cairo 11740af	
1600	1700	Ethiopia, Radio 5990af 7110af 7165af	
		9560af 9704af 11800af	
1600	1700	France, Radio France Intl 7170af 11615af	
		15160af 15605af 17605af	
1600	1700	Germany, CVC International 15795as	
1600	1700	Germany, CVC The Voice Africa 15715af	
1600	1700	Germany, Deutsche Welle 6170as 9485as	
		15705as	
1600	1700	Italy, IRRS 5785va 9310va	
1600	1700	Malaysia, RTM/Trax FM 7295as	
1600	1700	Malaysia, Voice of 6175as	
1600	1700	North Korea, Voice of Korea 9990va 11545va	
1600	1700	Papua New Guinea, Wantok R.Light 7120va	
1600	1700	Russia, Voice of 6070as 7370eu 9405as	
		11755as 11985af 12055va 12115as	
		15540me	
1600	1700	South Korea, KBS World Radio 5975va	
1600	1700	Swaziland, TWR 6130af	
1600	1700	Taiwan, Radio Taiwan Intl 11550as	
1600	1700	UK, BBC World Service 3915as 5975as	
		6195as 7160as 9510as 11955as	
		12095va 15485eu 15565eu 17790va	
1600	1700	UK, Bible Voice 13590me	
1600	1700	UK, Sudan Radio Service 15575af	
1600	1700	USA, American Forces Radio 4319usb 5446usb	
		5765usb 6350usb 7590usb 7812usb	
		10320usb 12133usb 12579usb 13362usb	
		13855usb	
1600	1700	USA, KALJ Dallas TX 13815na	
1600	1700	USA, KJES Vado NM 11715na	
1600	1700	USA, KTNB Salt Lake City UT 15590na	
1600	1700	USA, KWHR Naalehu HI 9930as	
1600	1700	USA, Voice of America 4930af 7405af	
		15195va 12080af 13600va 15410af	
		15445va 15580af 17895af	
1600	1700	USA, WBCQ Kennebunk ME 9330na	
1600	1700	USA, WBOH Newport NC 5920am	
1600	1700	USA, WEWN Birmingham AL 13615na	
1600	1700	USA, WHRA Greenbush ME 17640na	
1600	1700	USA, WHRI Noblesville IN 9840am 13760am	
		15285am	
1600	1700	USA, WINB Red Lion PA 13570am	
1600	1700	USA, WMLK Bethel PA 9265eu	
1600	1700	USA, WTJC Newport NC 9370na	
1600	1700	USA, WWCR Nashville TN 9985na 12160na	
		13845na 15825na	
1600	1700	USA, WWRB Manchester TN 9385na 11915na	
1600	1700	USA, WYFR Okeechobee FL 6085va 6085va	
		13695va 18980va 21455va 2525va	
1600	1700	Zambia, Christian Voice 4965af	
1615	1630	Vatican City, Vatican Radio 4005eu 5885eu	
		7250eu 9645eu 15595va	
1615	1700	UK, BBC World Service 3255af 6190af	
		12095af 15105af 15420af 15485af	
		17830af 17885af 21470af 21660af	
1615	1700	UK, BBC World Service 9695af 11690af	
		UK, Bible Voice 9430me	
1615	1700	Guam, AWR/KSDA 11975as	
1630	1700	UK, Bible Voice 13580me	
1630	1700	UK, Bible Voice 9430me	
1640	1650	Turkmenistan, Turkmen Radio 4930eu	
1651	1700	New Zealand, Radio NZ Intl 6095pa	
1651	1700	New Zealand, Radio NZ Intl 7145pa	

1700 UTC - 1PM EDT / 12PM CDT / 10AM PDT

1700	1715	UK, Bible Voice 13580me	
1700	1727	Czech Rep, Radio Prague 5930va 17485va	
1700	1730	France, Radio France Intl 15605af 17605af	
1700	1735	UK, Bible Voice 9430me 13580af	
1700	1745	UK, BBC World Service 3255af 6005af	
		6190af 9630af 9740as 11945af	
		12095va 15105af 15400af	
		17830af 17885af 21470af	
1700	1755	South Africa, Channel Africa 15235af	
1700	1759	Poland, Radio Polonia 7220eu 7265eu	
1700	1759	UK, Bible Voice 9430me	
1700	1800	Anguilla, University Network 11775am	
1700	1800	Australia, CVC International 13635as	
1700	1800	Australia, Radio 5995pa 6080pa 9475va	
		9580pa 9710pa 11880pa	
1700	1800	Bulgaria, World Radio Network 11540eu	
1700	1800	Canada, CBC NQ SW Service 9625na	
1700	1800	Canada, CFRX Toronto ON 6070na	
1700	1800	Canada, CFVP Calgary AB 6030na	
1700	1800	Canada, CKZN St John's NF 6160na	
1700	1800	Canada, CKZU Vancouver BC 6160na	
1700	1800	China, China Radio Intl 9570af 9600eu	
		11900af 11940eu 13760eu	
1700	1800	Costa Rica, University Network 11870va	
		13750va	
1700	1800	Egypt, Radio Cairo 11740af	

1700	1800	Germany, CVC The Voice Africa 15715af	
1700	1800	Italy, IRRS 5785va	
1700	1800	Italy, IRRS 5775va	
1700	1800	Japan, Radio Japan/NHK World 9535na	
		11970eu 15355af	
1700	1800	Japan, Radio Japan/NHK World 9770eu	
1700	1800	Japan, Radio Japan/NHK World 9535va	
		11970eu 15355af	
1700	1800	Malaysia, RTM/Trax FM 7295as	
1700	1800	Malaysia, Voice of 6175as	
1700	1800	New Zealand, Radio NZ Intl 6095pa	
1700	1800	New Zealand, Radio NZ Intl 7145pa	
1700	1800	Nigeria, Voice of 15120va	
1700	1800	Papua New Guinea, Wantok R.Light 7120va	
1700	1800	Russia, Voice of 7370eu 9405as 9890eu	
		11510af 11985af	
1700	1800	Russia, Voice of 9820eu	
1700	1800	Swaziland, TWR 3200af	
1700	1800	Taiwan, Radio Taiwan Intl 15690va	
1700	1800	UK, BBC World Service 3915as 5975as	
		6195eu 7160as 9410eu 9510as	
		11955as 15485va 15565eu	
1700	1800	UK, Sudan Radio Service 11705af	
1700	1800	USA, American Forces Radio 4319usb 5446usb	
		5765usb 6350usb 7590usb 7812usb	
		10320usb 12133usb 12579usb 13362usb	
1700	1800	USA, KALJ Dallas TX 13815na	
1700	1800	USA, KTNB Salt Lake City UT 15590na	
1700	1800	USA, KWHR Naalehu HI 9930as	
1700	1800	USA, Voice of America 7405af 15410af	
		15580af	
1700	1800	USA, WBCQ Kennebunk ME 9330na 18910na	
1700	1800	USA, WBOH Newport NC 5920am	
1700	1800	USA, WEWN Birmingham AL 13615va 15220va	
1700	1800	USA, WHRA Greenbush ME 17640na	
1700	1800	USA, WHRI Noblesville IN 13760am 15285am	
		15665am 15785am	
1700	1800	USA, WINB Red Lion PA 13570am	
1700	1800	USA, WMLK Bethel PA 9265eu	
1700	1800	USA, WTJC Newport NC 9370na	
1700	1800	USA, WWCR Nashville TN 9985na 12160na	
		13845na 15825na	
1700	1800	USA, WWRB Manchester TN 9385na 11915na	
		15250na	
1700	1800	USA, WYFR Okeechobee FL 13690va 17795va va	
		18980va 21455va	
1700	1800	Zambia, Christian Voice 4965af	
1730	1745	Israel, Kol Israel 9345va 11590va 13675va	
1730	1745	UK, United Nations Radio 7170af 15495me	
		17810af	
1730	1800	Bulgaria, Radio 9500eu 11500eu	
1730	1800	Guam, AWR/KSDA 9385as	
1730	1800	Liberia, ELWA 4760do	
1730	1800	Philippines, Radio Pilipinas 11720va 15190va	
		17720va	
1730	1800	Swaziland, TWR 9500af	
1730	1800	Sweden, Radio 6065va	
1730	1800	USA, Voice of America 13755af 17730af	
1730	1800	Vatican City, Vatican Radio 11625af 13765af	
		15570af	
1745	1800	India, All India Radio 7410eu 9445af	
		9950eu 11620eu 11935af 13605af	
		15075af 15155af 17670af	
1745	1800	UK, BBC World Service 3255af 6190af	
		11945af 12095af 15105af 15400af	
		15485af 17830af 17885af 21470af	

1800 UTC - 2PM EDT / 1PM CDT / 11AM PDT

1800	1815	UK, Bible Voice 13590me	
1800	1828	Vietnam, Voice of 5955eu 7280va 9730va	
1800	1830	Austria, AWR Europe 15315af	
1800	1830	South Africa, AWR Africa 3215af 3345af	
		9610af	
1800	1830	UK, BBC World Service 3255af 5975as	
		6190af 9510as 11945af 12095af	
		15400af	
1800	1830	UK, Bible Voice 13590me 13810af	
1800	1830	UK, Bible Voice 11710me	
1800	1830	USA, Voice of America 7405af 11975af	
		15410af 15580af 17895af	
1800	1830	USA, Voice of America 4930af	
1800	1845	USA, WYFR Okeechobee FL 17535va	
1800	1850	New Zealand, Radio NZ Intl 6095pa	
1800	1850	New Zealand, Radio NZ Intl 7145pa	
1800	1850	Romania, Radio Romania Intl 9635eu 11730eu	
1800	1859	Canada, Radio Canada Intl 9530af 11765af	
		13730af 15255af	
1800	1900	Anguilla, University Network 11775am	
1800	1900	Argentina, RAE 9690eu 15345eu	
1800	1900	Australia, Radio 6080pa 7240pa 9475va	
		9580pa 9710pa 11880pa	
1800	1900	Bulgaria, World Radio Network 9310eu	
1800	1900	Canada, CFRX Toronto ON 6070na	

1800	1900	Canada, CFVP Calgary AB	6030na	
1800	1900	Canada, CKZN St John's NF	6160na	
1800	1900	Canada, CKZU Vancouver BC	6160na	
1800	1900	China, China Radio Intl	9600eu	11940eu
		13760eu		
1800	1900	Costa Rica, University Network	11870va	
		13750va		
1800	1900	Germany, CVC The Voice Africa	13820af	
1800	1900	India, All India Radio	7410eu	9445af
		9950eu	11620eu	11935af
		15075af	15155af	17670af
1800	1900	Italy, IRRS	5775va	
1800	1900	Italy, IRRS	5785va	
1800	1900	Liberia, ELWA	4760do	
1800	1900	Malaysia, RTM/Trax FM	7295as	
1800	1900	Malaysia, Voice of 6175as		
1800	1900	Netherlands, Radio	6020af	7120af
		11655af		
1800	1900	Nigeria, Voice of	15120va	
1800	1900	North Korea, Voice of Korea	7570eu	12015eu
		13760eu	15245eu	
1800	1900	Papua New Guinea, Wantok R.Light	7120va	
1800	1900	Philippines, Radio Pilipinas	11720va	15190va
		17720va		
1800	1900	Russia, Voice of	7370eu	9745af
		9890eu	11510af	9820eu
1800	1900	Swaziland, TWR	3200af	9500af
1800	1900	Taiwan, Radio Taiwan Intl	3965eu	
1800	1900	UK, BBC World Service	6195eu	9410eu
		12095eu		
1800	1900	UK, Bible Voice	6015eu	11710al
1800	1900	USA, American Forces Radio	4319usb	5446usb
		5765usb	6350usb	7590usb
		10320usb	12133usb	12579usb
		13855usb		13362usb
1800	1900	USA, KAIJ Dallas TX	13815na	
1800	1900	USA, KTRN Salt Lake City UT	15590na	
1800	1900	USA, WBCQ Kennebunk ME	7415na	
1800	1900	USA, WBCQ Kennebunk ME	9330na	18910na
1800	1900	USA, WBOH Newport NC	5920am	
1800	1900	USA, WEWN Birmingham AL	13615va	15220va
1800	1900	USA, WHRA Greenbush ME	17640na	
1800	1900	USA, WHRI Noblesville IN	13760am	15285am
		15665am	15785am	
1800	1900	USA, WINB Red Lion PA	13570am	
1800	1900	USA, WMLK Bethel PA	9265eu	
1800	1900	USA, WTJC Newport NC	9370na	
1800	1900	USA, WWCR Nashville TN	9975na	12160na
		13845na	15825na	
1800	1900	USA, WWRB Manchester TN	9385na	11915na
		15250na		
1800	1900	USA, WYFR Okeechobee FL	13690va	13800va
		15750af	17795va	
1800	1900	Yemen, Rep of Yemen Radio	9780me	
1800	1900	Zambia, Christian Voice	4965af	
1815	1900	Bangladesh, Bangla Betar	7185eu	
1830	1900	Turkey, Voice of	9785eu	
1830	1900	UK, BBC World Service	3255af	6005af
		6190af	9630af	11945af
		12095af	15400af	12045me
		21470af		17795af
				17830af
1830	1900	USA, Voice of America	4930af	7405af
		11975af	15410af	15580af
1845	1900	Albania, Radio Tirana	7465eu	17895af
1845	1900	Congo, RTV Congolaise	4765af	5985af
1851	1900	New Zealand, Radio NZ Intl	9630pa	
1851	1900	New Zealand, Radio NZ Intl	9440pa	

1900 UTC - 3PM EDT / 2PM CDT / 12PM PDT

1900	1915	Congo, RTV Congolaise	4765af	5985af
1900	1920	Turkey, Voice of	9785eu	
1900	1925	Israel, Kol Israel	9400va	11590va
1900	1928	Vietnam, Voice of	7280va	9730va
1900	1929	Germany, Universal Life	11880me	
1900	1930	Hungary, Radio Budapest	3975eu	6025eu
1900	1930	Lithuania, Radio Vilnius	9710eu	
1900	1930	Philippines, Radio Pilipinas	11720va	15190va
		17720va		
1900	1930	UK, Bible Voice	6015eu	9775al
1900	1945	India, All India Radio	7410eu	9445af
		9950eu	11620eu	11935af
		15075af	15155af	17670af
1900	1945	USA, WYFR Okeechobee FL	6085va	
1900	1950	New Zealand, Radio NZ Intl	9630pa	
1900	1950	New Zealand, Radio NZ Intl	9440pa	
1900	2000	Anguilla, University Network	11775am	
1900	2000	Australia, Radio	6080pa	9500as
		9580pa	9710pa	11880pa
1900	2000	Bulgaria, World Radio Network		9310eu
1900	2000	Canada, CFRX Toronto ON	6070na	
1900	2000	Canada, CFVP Calgary AB	6030na	
1900	2000	Canada, CKZN St John's NF	6160na	
1900	2000	Canada, CKZU Vancouver BC	6160na	
1900	2000	China, China Radio Intl	7295af	9440va

1900	2000	Costa Rica, University Network	11870va	
		13750va		
1900	2000	Eqt Guinea, Radio Africa	15190af	
1900	2000	Germany, CVC The Voice Africa		13820af
1900	2000	Germany, Deutsche Welle	13780af	15620af
1900	2000	Germany, Overcomer Ministries		9860af
1900	2000	Ghana, Ghana BC Corp	3366do	4915do
1900	2000	Italy, IRRS	5775va	5785va
1900	2000	Liberia, ELWA	4760do	
1900	2000	Malaysia, RTM/Trax FM	7295as	
1900	2000	Namibia, Namibian BC Corp	3270do	3290do
		6060do	6175do	
1900	2000	Netherlands, Radio	5905af	7120af
		11655af	17810af	
1900	2000	Netherlands, Radio	15315na	17735na
		17660na		
1900	2000	Nigeria, Radio/Ibadan	6050do	
1900	2000	Nigeria, Radio/Kaduna	4770do	6090do
1900	2000	Nigeria, Radio/Lagos	3326do	4990do
1900	2000	Nigeria, Voice of	15120va	
1900	2000	North Korea, Voice of Korea	7100af	9975va
		11535va	11910af	
1900	2000	Papua New Guinea, Catholic Radio		4960do
1900	2000	Papua New Guinea, NBC	4890do	
1900	2000	Papua New Guinea, Wantok R.Light		7120va
1900	2000	Russia, Voice of	7310eu	9890eu
1900	2000	Sierra Leone, SLBS3316do		12070eu
1900	2000	Solomon Islands, SIBC	5020do	9545do
1900	2000	South Korea, KBS World Radio		5975va
		7275eu		
1900	2000	Sri Lanka, SLBC	6010eu	
1900	2000	Swaziland, TWR	3200af	
1900	2000	Thailand, Radio	7155eu	
1900	2000	Uganda, Radio	4976do	5026do
1900	2000	UK, BBC World Service	3255af	6005af
		6190af	6195eu	9410eu
		12045me	12095af	15400af
		17830af		17795af
1900	2000	UK, Bible Voice	9405af	
1900	2000	USA, American Forces Radio	4319usb	5446usb
		5765usb	6350usb	7590usb
		10320usb	12133usb	12579usb
		13855usb		13362usb
1900	2000	USA, KAIJ Dallas TX	13815na	
1900	2000	USA, KJES Vado NM	15385na	
1900	2000	USA, KTRN Salt Lake City UT	15590na	
1900	2000	USA, Voice of America	4930af	4940af
		6040me	7405af	9670me
		15410af	15445af	15580af
1900	2000	USA, WBCQ Kennebunk ME	7415na	9330na
		18910na		
1900	2000	USA, WBOH Newport NC	5920am	
1900	2000	USA, WEWN Birmingham AL	13615va	15220va
1900	2000	USA, WHRA Greenbush ME	13710na	
1900	2000	USA, WHRI Noblesville IN	13760am	15285am
		15665am	15785am	
1900	2000	USA, WINB Red Lion PA	13570am	
1900	2000	USA, WTJC Newport NC	9370na	
1900	2000	USA, WWCR Nashville TN	9975na	12160na
		13845na	15825na	
1900	2000	USA, WWRB Manchester TN	9385na	11915na
		15250na		
1900	2000	USA, WYFR Okeechobee FL	3230va	
		13800va	17795va	17845va
		18980va		18930va
1900	2000	Zambia, Christian Voice	4965af	
1900	2000	Zimbabwe, ZBC Corp	5975do	
1910	1930	Armenia, Voice of	4810eu	9960eu
1930	2000	Germany, Pan American BC	9430me	
1930	2000	Iran, Voice of the Islamic Rep	6205eu	7205eu
		7540af	9800af	9925af
1930	2000	Sweden, Radio	6065va	
1930	2000	UK, Bible Voice	9775af	
1935	1955	Italy, RAI Intl	5960eu	9485eu
1945	2000	Rwanda, Radio	6055do	
1950	2000	Vatican City, Vatican Radio	4005eu	5885eu
		7250eu	9645eu	
1951	2000	New Zealand, Radio NZ Intl	15720pa	
1951	2000	New Zealand, Radio NZ Intl	13730pa	

2000 UTC - 4PM EDT / 3PM CDT / 1PM PDT

2000	2015	f	Germany, Pan American BC	9430me	
2000	2020		Vatican City, Vatican Radio	4005eu	5885eu
			7250eu	9645eu	
2000	2027		Czech Rep, Radio Prague	5930va	11600va
2000	2030	mtwhfa	Albania, Radio Tirana	7465eu	
2000	2030	a	Germany, Pan American BC	9430me	
2000	2030		Iran, Voice of the Islamic Rep	6205eu	7205eu
			7540af	9800af	9925af
2000	2030		Mongolia, Voice of	12015eu	
2000	2030		South Africa, AWR Africa	7180af	
2000	2030		Swaziland, TWR	3200af	
2000	2030	h	UK, Bible Voice	9605va	

2000	2030		USA, Voice of America	4940af	4940af
			7405af 11975af 15410af 15445af		
2000	2030		Vatican City, Vatican Radio	9755af	11625af
			13765af		
2000	2045		USA, WYFR Okeechobee FL	13690va	17750va
2000	2059		Canada, Radio Canada Intl	5850eu	7235eu
			11765eu		
2000	2059	mtwhf	Spain, Radio Exterior Espana	9595af	15290eu
2000	2100		Anguilla, University Network	11775am	
2000	2100		Australia, ABC NT Alice Springs		2310do
			4835irr		
2000	2100		Australia, ABC NT Katherine	2485do	
2000	2100		Australia, ABC NT Tennant Creek		2325do
2000	2100		Australia, Radio	9500as 11650pa	11660pa
			11880pa 12080pa		
2000	2100	DRM	Bulgaria, World Radio Network		9310eu
2000	2100		Canada, CFRX Toronto ON	6070na	
2000	2100		Canada, CFVP Calgary AB	6030na	
2000	2100		Canada, CKZN St John's NF	6160na	
2000	2100		Canada, CKZU Vancouver BC	6160na	
2000	2100		Canada, Radio Canada Intl	17765am	
2000	2100		China, China Radio Intl	7295as 9440va	13630af
			9800eu 11640af 11790eu		13750va
2000	2100		Costa Rica, University Network		
2000	2100		Egypt, Radio Cairo	15375af	
2000	2100		Eqt Guinea, Radio Africa	15190af	
2000	2100		Germany, CVC The Voice Africa		9765af
2000	2100		Germany, Deutsche Welle	7130af	11795af
			13780af 15205af		
2000	2100	vi	Ghana, Ghana BC Corp	3366do	4915do
2000	2100		Indonesia, Voice of	9525as	11785pa
			15150al		
2000	2100		Italy, IRRS	5775va	5785va
2000	2100		Liberia, ELWA	4760do	
2000	2100		Malaysia, RTM/Trax FM	7295as	
2000	2100	vi	Namibia, Namibian BC Corp	3270do	3290do
			6060do 6175do		
2000	2100	as	Netherlands, Radio	15315af	17735na
			17660af		
2000	2100		Netherlands, Radio	5905af	7120af
			11665af 17810af		
2000	2100		New Zealand, Radio NZ Intl	15720pa	
2000	2100	DRM	New Zealand, Radio NZ Intl	13730pa	
2000	2100		Nigeria, Radio/Ibadan	6050do	
2000	2100		Nigeria, Radio/Kaduna	4770do	6090do
2000	2100		Nigeria, Radio/Lagos	3326do	4990do
2000	2100		Nigeria, Voice of	15120va	
2000	2100		Papua New Guinea, Catholic Radio		4960do
2000	2100		Papua New Guinea, NBC	4890do	
2000	2100	vi	Papua New Guinea, Wantok R.Light	7120va	
2000	2100		Russia, Voice of	9890eu 12070eu	15455eu
			15735sa		
2000	2100	vi	Solomon Islands, SIBC	5020do	9545do
2000	2100		South Africa, Channel Africa	3345af	
2000	2100	vi	Uganda, Radio	4976do	7196do
2000	2100		UK, BBC World Service	3255af 6005af	9630af
			6190af 6195eu 9410eu		
			12095af 15400af 17830af		
2000	2100		UK, Bible Voice	9405af	
2000	2100		USA, American Forces Radio	4319usb 5446usb	
			5765usb 6350usb 7590usb 7812usb		
			10320usb 12133usb 12579usb 13362usb		
			13855usb		
2000	2100		USA, KAIJ Dallas TX	13815na	
2000	2100		USA, KJES Vado NM	15385na	
2000	2100		USA, KTBN Salt Lake City UT	15590na	
2000	2100		USA, WBCQ Kennebunk ME	7415na	9330na
			18910na		
2000	2100		USA, WBOH Newport NC	5920am	
2000	2100		USA, WEWN Birmingham AL	13615va	15220va
2000	2100		USA, WHRA Greenbush ME	13710na	
2000	2100		USA, WHRI Noblesville IN	13760am	15285am
			15665am 15785am		
2000	2100		USA, WINB Red Lion PA	13570am	
2000	2100		USA, WTJC Newport NC	9370na	
2000	2100		USA, WWCN Nashville TN	9975na	12160na
			13845na 15825na		
2000	2100		USA, WWRB Manchester TN	9385na	11915na
			15250na		
2000	2100		USA, WYFR Okeechobee FL	3230va	13800va
			17725va 17795va		18980va
2000	2100		Zambia, Christian Voice	4965af	
2000	2100	vi	Zimbabwe, ZBC Corp	5975do	
2005	2100		Syria, Radio Damascus	9330eu	12085eu
			13610al		
2025	2045		Italy, RAI Intl	5970af	11875af
2030	2045		Thailand, Radio	9680eu	
2030	2058		Vietnam, Voice of	7280va	9550va 9730va
			13860va		
2030	2100	mtbf	Belarus, Radio	7125eu	7340eu 7440eu
2030	2100		Cuba, Radio Havana		9505va 11760va
2030	2100		Turkey, Voice of	7170as	
2030	2100		USA, Voice of America	4930af 7555as	15445af 15580af
			11975af 15410af		
2030	2100	as	USA, Voice of America	4940af	

2045	2100		India, All India Radio	7410eu	9445eu
			9910oc	9950eu	11620va
2055	2100	DRM	Vatican City, Vatican Radio	9800na	11715oc

2100 UTC - 5PM EDT / 4PM CDT / 2PM PDT

2100	2120		Turkey, Voice of	7180as	
2100	2123		Serbia, International Radio Serbia		6185eu
2100	2130		Australia, ABC NT Katherine	2485do	
2100	2130		Australia, ABC NT Tennant Creek		2325do
2100	2130		Austria, AWR Europe	11955af	
2100	2130	a	Canada, CBC NQ SW Service	9625na	
2100	2130		China, China Radio Intl	11640af	13630af
2100	2130		Cuba, Radio Havana	9505va	11760va
2100	2130		Egypt, Radio Cairo	15375af	
2100	2130		Hungary, Radio Budapest	6025eu	9525eu
2100	2130		South Korea, KBS World Radio		3955eu
2100	2130		UK, BBC World Service	11675va	15390va
2100	2130	DRM	Vatican City, Vatican Radio	9800na	
2100	2145		Nigeria, Radio/Ibadan	6050do	
2100	2145		USA, WYFR Okeechobee FL	13690va	13800va
			17795va 18980va		
2100	2159		Canada, Radio Canada Intl	9800na	17765na
2100	2159	as	Spain, Radio Exterior Espana	9595af	9840eu
2100	2200		Anguilla, University Network	11775am	
2100	2200		Australia, ABC NT Alice Springs		2310do
			4835irr		
2100	2200		Australia, Radio	7240pa 9660pa	11650pa
			11660pa 11695pa	12080pa	13630pa
2100	2200		Bulgaria, Radio	5800eu	7500eu
2100	2200		Canada, CFRX Toronto ON	6070na	
2100	2200		Canada, CFVP Calgary AB	6030na	
2100	2200		Canada, CKZN St John's NF	6160na	
2100	2200		Canada, CKZU Vancouver BC	6160na	
2100	2200		China, China Radio Intl	9600eu	9800eu
			11790eu		
2100	2200		Costa Rica, University Network		13750va
2100	2200		Eqt Guinea, Radio Africa	15190af	
2100	2200		Germany, Deutsche Welle	9440af	11865af
			15210af		
2100	2200	vi	Ghana, Ghana BC Corp	3366do	4915do
2100	2200		Guyana, Voice of	3291do	5950do
2100	2200		India, All India Radio	9910oc	11620oc
			11715oc		
2100	2200		Italy, IRRS	5775va	5785va
2100	2200		Japan, Radio Japan/NHK World	6055eu 6180eu	11855af
			21670oc		
2100	2200		Liberia, ELWA	4760do	
2100	2200		Liberia, Star Radio	11960af	
2100	2200		Malaysia, RTM/Trax FM	7295as	
2100	2200	vi	Namibia, Namibian BC Corp	3270do	3290do
			6060do 6175do		
2100	2200		New Zealand, Radio NZ Intl	15720pa	
2100	2200	DRM	New Zealand, Radio NZ Intl	13730pa	
2100	2200		Nigeria, Radio/Kaduna	4770do	6090do
2100	2200		Nigeria, Radio/Lagos	3326do	4990do
2100	2200		North Korea, Voice of Korea	7570eu	12015eu
			13760eu 15245eu		
2100	2200		Papua New Guinea, Catholic Radio		4960do
2100	2200		Papua New Guinea, NBC	4890do	
2100	2200	vi	Papua New Guinea, Wantok R.Light	7120va	
2100	2200		Russia, Voice of	15735sa	
2100	2200	vi	Rwanda, Radio	6055do	
2100	2200	irreg/ vi	Sierra Leone, SLBS3316do		
2100	2200		South Africa, Channel Africa	3345af	
2100	2200		Syria, Radio Damascus	9330eu	12085eu
			13610al		
2100	2200		UK, BBC World Service	3255af 3915as	6195as
			5965as 6005af 6190af		
			11945as 12095af 15400af		
2100	2200		Ukraine, Radio Ukraine Intl	7490eu	
2100	2200		USA, American Forces Radio	4319usb 5446usb	
			5765usb 6350usb 7590usb 7812usb		
			10320usb 12133usb 12579usb 13362usb		
			13855usb		
2100	2200		USA, KAIJ Dallas TX	13815na	
2100	2200		USA, KTBN Salt Lake City UT	15590na	
2100	2200		USA, Voice of America	7555as	
2100	2200		USA, WBCQ Kennebunk ME	7415na	9330na
			18910na		
2100	2200		USA, WBOH Newport NC	5920am	
2100	2200		USA, WEWN Birmingham AL	13615va	15220va
2100	2200		USA, WHRA Greenbush ME	11610na	11765na
2100	2200		USA, WHRI Noblesville IN	13760am	15285am
			15665am 15785am		
2100	2200		USA, WINB Red Lion PA	13570am	
2100	2200		USA, WRMI Miami FL	7385am	
2100	2200		USA, WTJC Newport NC	9370na	
2100	2200		USA, WWCN Nashville TN	9975na	12160na
			13845na 15825na		
2100	2200		USA, WWRB Manchester TN	9385na	11915na
			15250na		
2100	2200		USA, WYFR Okeechobee FL	6045va	11565va
			17725va 17845va		

2100	2200	Zambia, Christian Voice	4965af	
2100	2200	Zimbabwe, ZBC Corp	5975do	
2115	2200	Egypt, Radio Cairo 9990eu		
2130	2156	Romania, Radio Romania Intl	7210va	9535va
		11940va	15465va	
2130	2157	Czech Rep, Radio Prague	9410na	11600af
2130	2200	Albania, Radio Tirana	7465eu	
2130	2200	Australia, ABC NT Katherine	5025do	
2130	2200	Australia, ABC NT Tennant Creek		4910do
2130	2200	Canada, CBC NQ SW Service	9625na	
2130	2200	Netherlands, Radio	9800na	
2130	2200	Sweden, Radio	6065va	7420va
2130	2200	UK, BBC World Service	15390va	

2200 UTC - 6PM EDT / 5PM CDT / 3PM PDT

2200	2210	Syria, Radio Damascus	9330eu	12085eu
2200	2230	Belarus, Radio	7125eu	7340eu 7440eu
2200	2230	Belarus, Radio	7125eu	7340eu 7440eu
2200	2230	Cuba, Radio Havana	9505va	11760va
2200	2230	Germany, Deutsche Welle	9800na	
2200	2230	India, All India Radio	9910oc	11620oc
		11715oc	9950eu	11620va 11715oc
2200	2230	Papua New Guinea, NBC	4890do	
2200	2235	New Zealand, Radio NZ Intl	15720pa	
2200	2235	New Zealand, Radio NZ Intl	13730pa	
2200	2245	Egypt, Radio Cairo 9990eu		
2200	2245	USA, WYFR Okeechobee FL	15770va	
2200	2250	Turkey, Voice of	9830eu	
2200	2259	Canada, Radio Canada Intl	6100na	
2200	2300	Anguilla, University Network	6090am	
2200	2300	Australia, ABC NT Alice Springs		2310do
		4835irr		
2200	2300	Australia, ABC NT Katherine	5025do	
2200	2300	Australia, ABC NT Tennant Creek		4910do
2200	2300	Australia, Radio	12010va	13620pa 13630pa
		15515pa	15230as	15240pa 17785pa
		17795pa		
2200	2300	Canada, CBC NQ SW Service	9625na	
2200	2300	Canada, CFRX Toronto ON	6070na	
2200	2300	Canada, CFVP Calgary AB	6030na	
2200	2300	Canada, CKZN St John's NF	6160na	
2200	2300	Canada, CKZU Vancouver BC	6160na	
2200	2300	Canada, Radio Canada Intl	9800na	
2200	2300	China, China Radio Intl	7170eu	
2200	2300	Costa Rica, University Network		13750va
2200	2300	Egypt, Radio Africa	15190af	
2200	2300	Germany, Deutsche Welle	7115as	9720na
2200	2300	Ghana, Ghana BC Corp	3366do	4915do
2200	2300	Guyana, Voice of	3291do	
2200	2300	Italy, IRRS	5785va	
2200	2300	Italy, IRRS	5775va	
2200	2300	Malaysia, RTM/Trax FM	7295as	
2200	2300	Namibia, Namibian BC Corp	3270do	3290do
		6060do	6175do	
2200	2300	Nigeria, Radio/Ibadan	6050do	
2200	2300	Nigeria, Radio/Kaduna	4770do	6090do
2200	2300	Nigeria, Radio/Lagos	3326do	4990do
2200	2300	Papua New Guinea, Catholic Radio		4960do
2200	2300	Papua New Guinea, Wantok R.Light		7120va
2200	2300	Sierra Leone, SLBS3316do		
2200	2300	Solomon Islands, SIBC	5020do	9545do
2200	2300	Taiwan, Radio Taiwan Intl	15600eu	
2200	2300	UK, BBC World Service	5955af	5965as
		5975va	6195as	7105as 9740as
		12095af	15400af	
2200	2300	USA, American Forces Radio	4319usb	5446usb
		5765usb	6350usb	7590usb 7812usb
		10320usb	12133usb	12579usb 13362usb
		13855usb		
2200	2300	USA, KAIJ Dallas TX	13815na	
2200	2300	USA, KTBN Salt Lake City UT	15590na	
2200	2300	USA, Voice of America	7215va	7555as
		11725va	15185va	15290va
2200	2300	USA, WBCQ Kennebunk ME	5110na	18910na
2200	2300	USA, WBCQ Kennebunk ME		9330na
2200	2300	USA, WBOH Newport NC	5920am	
2200	2300	USA, WEWN Birmingham AL	9975va	15745va
2200	2300	USA, WHRA Greenbush ME	11610na	11765na
2200	2300	USA, WHRI Noblesville IN	7490am	
2200	2300	USA, WHRI Noblesville IN	9840am	13760am
		15285am		
2200	2300	USA, WINB Red Lion PA	13570am	
2200	2300	USA, WRMI Miami FL	7385am	
2200	2300	USA, WRMI Miami FL	9955am	
2200	2300	USA, WTJC Newport NC	9370na	
2200	2300	USA, WWCR Nashville TN	7465na	9985na
		12160na	13845na	
2200	2300	USA, WWRB Manchester TN	9385na	11915na
		15250na		
2200	2300	USA, WYFR Okeechobee FL	11740va	15195va
2200	2300	Zambia, Christian Voice	4965af	
2205	2230	Italy, RAI Intl	11895as	
2215	2230	Croatia, Croatian Radio	9925sa	
2230	2257	Czech Rep, Radio Prague	7345na	9415af

2230	2300	Papua New Guinea, NBC	9675do	
2230	2300	USA, Voice of America	9570va	13755va
		15145va		
2236	2300	New Zealand, Radio NZ Intl	13730pa	
2236	2300	New Zealand, Radio NZ Intl	15720pa	
2245	2300	India, All India Radio	9705as	9950as
		11620as	11645as	13605as

2300 UTC - 7PM EDT / 6PM CDT / 4PM PDT

2300	0000	Anguilla, University Network	6090am	
2300	0000	Australia, ABC NT Alice Springs		2310do
		4835irr		
2300	0000	Australia, ABC NT Katherine	5025do	
2300	0000	Australia, ABC NT Tennant Creek		4910do
2300	0000	Bulgaria, Radio	9700na	11700na
2300	0000	Canada, CBC NQ SW Service	9625na	
2300	0000	Canada, CFRX Toronto ON	6070na	
2300	0000	Canada, CFVP Calgary AB	6030na	
2300	0000	Canada, CKZN St John's NF	6160na	
2300	0000	Canada, CKZU Vancouver BC	6160na	
2300	0000	China, China Radio Intl	5990am	6145na
		13680na		
2300	0000	Costa Rica, University Network		13750va
2300	0000	Cuba, Radio Havana		9550na
2300	0000	Egypt, Radio Cairo 11950na		
2300	0000	Germany, Deutsche Welle	5955as	9890as
		15135as	17860as	
2300	0000	Ghana, Ghana BC Corp	3366do	4915do
2300	0000	Guyana, Voice of	3291do	
2300	0000	India, All India Radio	9705as	9950as
		11620as	11645as	13605as
2300	0000	Malaysia, RTM/Trax FM	7295as	
2300	0000	Namibia, Namibian BC Corp	3270do	3290do
		6060do	6175do	
2300	0000	New Zealand, Radio NZ Intl	13730pa	
2300	0000	New Zealand, Radio NZ Intl	15720pa	
2300	0000	Papua New Guinea, Catholic Radio		4960do
2300	0000	Papua New Guinea, NBC	9675do	
2300	0000	Papua New Guinea, Wantok R.Light		7120va
2300	0000	Romania, Radio Romania Intl	6140va	7265va
		9645va	11940va	
2300	0000	Sierra Leone, SLBS3316do		
2300	0000	Singapore, MediaCorp Radio	6150do	
2300	0000	Solomon Islands, SIBC	5020do	9545do
2300	0000	UK, BBC World Service	3915as	5965as
		6195as	9580as	9740as 11850as
		11945as	11955as	
2300	0000	USA, American Forces Radio	4319usb	5446usb
		5765usb	6350usb	7590usb 7812usb
		10320usb	12133usb	12579usb 13362usb
		13855usb		
2300	0000	USA, KAIJ Dallas TX	13815na	
2300	0000	USA, KTBN Salt Lake City UT	15590na	
2300	0000	USA, Voice of America	7215va	7555as
		11725va	15185va	
2300	0000	USA, WBCQ Kennebunk ME	5110na	7415na
		9330na	18910na	
2300	0000	USA, WBOH Newport NC	5920am	
2300	0000	USA, WEWN Birmingham AL	9975va	15745va
2300	0000	USA, WHRA Greenbush ME	7520na	
2300	0000	USA, WHRI Noblesville IN	7490am	
2300	0000	USA, WHRI Noblesville IN	7555am	9840am
		13760am		
2300	0000	USA, WINB Red Lion PA	13570am	
2300	0000	USA, WRMI Miami FL	7385am	
2300	0000	USA, WTJC Newport NC	9370na	
2300	0000	USA, WWCR Nashville TN	5070na	7465na
		9985na	13845na	
2300	0000	USA, WWRB Manchester TN	6890na	
2300	0000	USA, WYFR Okeechobee FL	15255am	17750am
2300	0000	Zambia, Christian Voice	4965af	
2300	2315	Nigeria, Radio/Kaduna	4770do	6090do
2300	2315	Nigeria, Radio/Lagos	3326do	
2300	2330	Australia, Radio	9660pa	12010pa 12080pa
		13670va	15230va	15240va 17785va
		17795va		
2300	2330	Germany, Deutsche Welle	9800na	
2300	2330	USA, Voice of America	9570va	13755va
		15145va	17740va	
2300	2345	USA, WYFR Okeechobee FL	11740va	
2330	0000	Australia, HCJB	15390as	
2330	0000	Australia, Radio	9660pa	12010pa 12080pa
		13670va	15230va	15415va 17750as
		17785pa	17795va	
2330	0000	Burma, Dem Voice of Burma	5955eu	
2330	0000	Lithuania, Radio Vilnius	7325na	
2330	0000	Sweden, Radio	9800na	
2330	0000	USA, Voice of America	7260va	9570va
		13725va	13755va	15145va
2330	0000	USA, WRMI Miami FL	9955am	
2330	2358	Vietnam, Voice of	9840as	12020as

DoD Trunk Frequencies Discovered

Over the last ten years it has been interesting to watch the gradual changeover from conventional to trunk radio systems within the Department of Defense (DoD). This has been a result, in part, of narrowband policies being implemented by the entire federal government in all of their land mobile frequency ranges.

There are several VHF/UHF frequency ranges we monitor for DoD trunk system activity. The primary bands to search include 138.0-144.0, 148.0-150.8, 162.0-174.0, 380.0-399.9 and 406.0-420.0 MHz. We have analyzed each of these bands for possible frequency assignments of trunk radio systems, and have found possible frequency patterns in three of them – 138.0-144.0/148.0-150.8, and 380.0-399.9 MHz.

MT's *Milcom* column has covered the implementation and growth of the new 380-399.9 MHz land mobile band since the first sites were put on the air over two years ago. Now that we have two years' worth of data to work with, we can finally report on some frequencies to monitor for possible trunk and simplex radio activity.

It should be noted that not all frequencies in the 380-399.9 MHz band will be converted to Land Mobile Radio (LMR) assignments. Based on recent monitoring, we believe that some of the frequencies in this spectrum will probably continue to be used for aeronautical communications using the AM mode. But it does appear at this point that a majority of the frequencies in this new sub-band will be used for narrowband FM LMR purposes.

Based on our analysis, here is what we think we know about some of the frequencies in this new band. There are 800 possible frequency assignments in this 20 MHz of spectrum space (based on 12.5 kHz spacing). We have now been able to identify 41.5 percent of these assignments as to possible frequency usage. Obviously, information is still incomplete and changes in frequency usage we have identified are possible, since there is no way to nail down every frequency in this band this early in the game.

380-399.9 MHz LMR/Aero Frequencies (frequency spacing 12.5 kHz)

Simplex Frequencies

385.3750 387.8500 387.8875

Trunk Repeater Outputs

380.0625 380.0750 380.1250 380.1750 380.2750
380.3250 380.3750 380.4125 380.4250 380.4375
380.4500 380.4625 380.4875 380.5250
380.5500 380.5750 380.6250 380.6625 380.6750
380.6875 380.7125 380.7250 380.7375 380.8250
380.8375 380.8625 380.8750 380.8875 380.9125
380.9750 380.9875 381.0875 381.1125 381.1625
381.2375 381.2875 381.3250 381.3375 381.4250
381.6250 381.6750 381.6875 381.7375 381.7500
381.7750 381.7875 381.8250 381.8375 381.8750
381.9250 381.9500 381.9750 385.0125 385.0625

385.2125 385.3125 385.3500 385.6250 385.7000
385.7125 385.7750 385.7875 385.8000 385.8875
385.9000 385.9125 385.9250 385.9500 386.0125
386.0375 386.0625 386.0750 386.1000 386.1250
386.1375 386.1625 386.1750 386.1875 386.2000
386.2125 386.2250 386.2500 386.2875 386.3125
386.3375 386.3500 386.4000 386.4125 386.4375
386.5000 386.5500 386.5625 386.5875 386.6125
386.6375 386.6625 386.6750 386.7250 386.7375
386.7625 386.8000 386.8125 386.8250 386.8500
386.9125 386.9500 386.9625 386.9875 387.0625
387.2250 387.2375 387.3375 387.3750 387.5250
387.5375 387.6375 387.6750 387.8250 388.0000
388.0250 388.1125 388.1375 388.1625 388.1875
388.2125 388.2500 388.2625 388.3125 388.3375
388.4125 388.5500 388.5625 388.7000 388.8500
388.8875 389.1250 389.1625 389.2375 389.3000
389.4875 389.8375

Trunk Repeater Inputs

390.0625 390.0750 390.1250 390.1750 390.2750
390.3250 390.3750 390.4125 390.4250 390.4375
390.4500 390.4625 390.4875 390.5250 390.5500
390.5750 390.6250 390.6625 390.6750 390.6875
390.7125 390.7250 390.7375 390.8250 390.8375
390.8625 390.8750 390.8875 390.9125 390.9750
390.9875 391.0875 391.1125 391.1625 391.2375
391.2875 391.3250 391.3375 391.4250 391.6250
391.6750 391.6875 391.7375 391.7500 391.7750
391.7875 391.8250 391.8375 391.8750 391.9250
391.9500 391.9750 395.0125 395.0625 395.2125
395.3125 395.3500 395.6250 395.7000 395.7125
395.7250 395.7875 395.8000 395.8875 395.9000
395.9125 395.9250 395.9500 396.0125 396.0375
396.0625 396.0750 396.1000 396.1250 396.1375
396.1625 396.1750 396.1875 396.2000 396.2125
396.2250 396.2500 396.2875 396.3125 396.3375
396.3500 396.4000 396.4125 396.4375 396.5000
396.5500 396.5625 396.5875 396.6125 396.6375
396.6625 396.6750 396.7250 396.7375 396.7625
396.8000 396.8125 396.8250 396.8500 396.9125
396.9500 396.9625 396.9875 397.0625 397.2250
397.2375 397.3375 397.3750 397.5250 397.5375
397.6375 397.6750 397.8250 398.0000 398.0250
398.1125 398.1375 398.1625 398.1875 398.2125
398.2500 398.2625 398.3125 398.3375 398.4125
398.5500 398.5625 398.7000 398.8500 398.8875
399.1250 399.1625 399.2375 399.3000 399.4875
399.8375

Aeronautical Frequencies

380.0000 380.0250 380.0500 380.1000 380.1500
380.2000 380.2250 380.2500 380.3000 380.3500
380.6000 381.0000 381.1000 381.3000 381.4000
381.4500 381.5000 381.5500 381.6000 381.6500
382.0000 384.6000 385.4000 385.4500 385.5000
385.5500 385.6000 385.6500 387.0000 387.0250
387.0500 387.0750 387.1000 387.1500 387.8000
388.2000 388.2250 388.4000 388.9500 390.8000
391.9000 392.1000 396.9000 397.8500 397.8750
397.9000

And as we mentioned in the top of this column, there are also new trunk frequencies that have been identified in the 138.0-144.0 and 148.0-150.8 MHz bands. All of them so far are on new 12.5 kHz splinter frequencies. A splinter frequency, in this case, is our way of identifying a frequency created after the band was shifted from 25 kHz to 12.5 kHz spacing.

138.0125 138.0375 138.0625 138.0875
138.1125 138.1375 138.1625 138.1875 138.2125
138.2375 138.2625 138.2875 138.3125 138.3375

138.3625 138.3875 138.4125 138.4625 138.5125
138.5375 138.5625 138.6125 138.6375 138.6875
138.7125 138.8875 139.0375 139.1875 139.3375
139.4875 139.6375 139.7625 139.7875 139.9375
140.6625 142.3375 143.3625 143.5375 143.6875
150.1125

We will have more information in future editions of this column and on our new MT-Milcom Blog site (<http://mt-milcom.blogspot.com>) as new frequencies are uncovered. If you have discovered new activity in any of the bands above, we would like to receive your field reports. You can send them to the email address in the masthead.

❖ Trunk System at the Point

We have received a field report of a new VHF P25 trunk system at the U.S. Military Academy, West Point, New York. We do not have any talk-groups yet, but here are the basic details of the system.

System Type: Project 25 Standard

Base Frequency: 136.000 MHz; Spacing: 12.5-kHz
Frequencies: 138.0375 138.1125c 138.1875 138.3375
138.5125 138.6875 139.0375 139.1875 139.3375
139.4875 139.6375 140.6625c

Five of the frequency repeaters are located at Bull Hill and seven are located at the Ski Slope. The radius covers the range areas and main post, and provides a link to Stewart Airbase.

The \$6.1 million system includes handheld devices (walkie-talkies), mobiles (for vehicles), and desktops for dispatchers that total 1,337 pieces of equipment. Base Radio Systems runs the contracts and M/A-COM, Inc. was chosen as the preferred vendor of the TRS system at West Point. M/A-COM, Inc. started installing the system in May 2006 and it was operational in mid-July.

The new system will provide better emergency services and communications among post organizations like the PMO, EOC, MEDDAC, security guards and the fire department, and that adds up to a safer community, said Michelle McCurry, a DOIM telecommunications specialist.

"It's about public safety," she explained. "This system gives us more communications and frees the extra frequencies we're not using, so we're not crossing over aviation frequencies and so forth." Additional information on this system is courtesy of October 5, 2005, edition of *The Pointer*.

❖ Another Westover ARB Update

We have an update of the new narrowband VHF frequencies being used at the Westover Air Reserve Base in Massachusetts from an anony-

mous source.

138.0750/148.4625 (P25) Security Police
140.8875/149.2875 (P25) Fire Department <Channel 2>
138.9625/150.5125 (P25) Fire Department <Channel 1>
142.450/150.600 (input is tentative) (P25) Communications Squadron Net
413.400 (Analog) Aerial Port Net

Thanks to our anonymous friend for this latest Westover update.

❖ Keflavik Closed

As first reported on the *MT-Milcom* blog, the HF Global Communications System (HF-GCS) station at the naval air station in Keflavik has been closed as of July 1, 2006. This was the result of a decision by the President of the United States in March that Naval Air Station, Keflavik, would begin a transition to a reduced “footprint” which will be completed by September 30, 2006.

Another victim of this closure is the base Armed Forces Network (AFN) station, colloquially known as “Yankee Radio.” It is unknown at presstime if the AFN shortwave outlet at Keflavik has left the air, but one unofficial source indicates it has.

❖ FAA ARTCC Frequency List

Finally, in this month’s FAA Air Route Traffic Control Center report we are going to take a look at the Seattle and Oakland Center frequencies in table one. For the background on the Air Route Traffic Control Centers, check out our *Milcom* column in the June 2005 issue of *MT*.

So until next month, 73 and good hunting.

Seattle/Oakland ARTCC Frequency List

SEATTLE ARTCC

Antelope Mountain, CA	124.850/306.300	Low Discrete: Approach/Departure Services
Arcata, CA	124.850/306.300	Low: Approach/Departure Services
Beacon Hill, WA	120.300/273.600	Low/High Discrete
	135.525/353.900	Low/High
Cottonwood, ID	118.550/251.100	High
	123.950/282.300	Low Discrete: Approach/Departure Services
Dallesport, WA	126.600/343.600	Low/High
Ferndale, CA	124.850/306.300	Low Discrete
	135.150/360.700	High
Fort Lawton, WA	128.500/306.900	Low Discrete: Approach/Departure Services
Hoquiam, WA	128.300/269.000	Low: Approach/Departure Services
Horton, OR	121.400/239.000	Low: Approach/Departure Services
	125.800/291.700	Low Discrete: Approach/Departure Services
	132.075	High
	243.000	Low/High: Military Emergency
	257.650	Low
	321.300	Ultra High: Tactical Support Use Frequency (FL450 and above) (Amber 6)
Kimberly, OR	135.450/281.400	High
Klamath Falls, OR	127.600/351.700	Low Discrete: Approach/Departure Services
	134.900/263.050	High
Lakeside, MT		

	123.950/282.300	Low Discrete: Approach/Departure Services
Lakeview, OR	127.600/351.300	Low Discrete
	135.350/335.550	High
	243.000	Low/High: Military Emergency
	321.300	Ultra High: Tactical Support Use Frequency (FL450 and above) (Amber 6)
Larch Mountain, WA	126.600/343.600	Low/High
	128.300/269.000	Low/High Discrete: Approach/Departure Services
Marlin, WA	126.100/291.600	Low Discrete: Approach/Departure Services
Medford, OR	121.400/239.000	Low Discrete: Approach/Departure Services
	124.850/306.300	Low: Approach/Departure Services
	135.150/360.700	High
Mohler, WA	128.450/307.800	High Discrete
Mullan Pass, ID	128.450/307.800	High Discrete
Nassel, WA	124.200/317.600	Low Discrete: Approach/Departure Services
Neah Bay, WA	125.100/319.200	Low/High Discrete
	243.000	Low/High: Military Emergency
	321.300	Ultra High: Tactical Support Use Frequency (FL450 and above) (Amber 6)
Redmond, OR	121.350/279.600	High
	128.150/257.750	Low Discrete: Approach/Departure Services
	134.900/263.050	High Discrete
	135.350/335.550	High
Rex-Parrett, OR	121.350/279.600	High Discrete
Scappoose, OR	124.200/317.600	Low Discrete: Approach/Departure Services
	128.150/257.750	Low
Seattle (Auburn), WA	121.500/243.000	Low/High: Civilian/Military Emergency
	321.300	Ultra High: Tactical Support Use Frequency (FL450 and above) (Amber 6)
Spokane, WA	119.225/335.500	Low
	123.950/282.300	Low Discrete
	243.000	Low/High: Military Emergency
	321.300	Ultra High: Tactical Support Use Frequency (FL450 and above) (Amber 6)
Stampede Pass, WA	134.950/270.300	Low/High Discrete
The Dalles, OR	119.650/257.600	Low Discrete: Approach/Departure Services
	135.450/281.400	High
Wallula, WA	132.600/269.350	Low Discrete: Approach/Departure Services
	243.000	Low/High: Military Emergency
	321.300	High: Tactical Support Use Frequency (FL450 and above) (Amber 6)
Wenatchee, WA	126.100/291.600	Low Discrete: Approach/Departure Services
Whidbey Island, WA	125.100/319.200	Low/High
	134.950/270.300	Low/High Discrete
Yakima, WA	118.550/251.100	High
	120.300/273.600	Low/High
	132.600/269.350	Low Discrete: Approach/Departure Services
	135.525/353.900	Low/High
OAKLAND ARTCC		
Angels Camp, CA	119.750	Low
	121.250/327.000	Low: Approach/Departure Services
	126.850/322.550	Low Discrete: Approach/Departure Services
	127.950	Low
	132.950	High

	134.375	High
	257.850	High
	281.500	High
	284.600	Low
	296.700	Low/High DNP
	316.100	Low
Bishop, CA	125.750/284.650	Low Discrete: Approach/Departure Services
Fallon, NV	121.500/243.000	Low/High: Civilian/Military Emergency
	128.800/285.500	Low Discrete: Approach/Departure Services
	134.450/269.300	High
	296.700	Low/High DNP
Ferndale, CA	134.150/387.100	Low/High
Fresno, CA	123.800/353.800	Low Discrete
	126.900/257.200	Low
	132.800	High
	133.700	High
	134.375	High
	281.500	High
	285.400	High
	296.700	Low/High DNP
	319.100	High
Half Moon Bay, CA	119.475	Low
	127.450	Low
	135.450/307.300	Low Discrete
	134.150/387.100	Low/High
	357.600	Low
	380.300	Low
Hollister, CA	127.450/357.600	Low: Approach/Departure Services
Mina, NV	125.750/284.650	Low
	127.175	High
	132.050	High
	273.450	High
	323.175	High
Mount Tamalpais, CA	127.800	Low Discrete: Approach/Departure Services
	296.700	High DNP
	353.500	Low Discrete
Oakland (Fremont), CA	121.500/243.000	Low/High: Civilian/Military Emergency
Priest, CA	126.900	Low
	128.700/307.000	Low Discrete: Approach/Departure Services
	132.800	High
	133.700	High
	134.550	High
	257.200	Low
	285.400	High
	290.500	High
	319.100	High
Red Bluff, CA	119.975	High
	132.200/350.200	Low: Approach/Departure Services
	134.975	High
	306.200	High
	379.200	High
Reno, NV	128.800/285.500	Low: Approach/Departure Services
	134.450/269.300	High
Oakland, CA	132.950	High
	257.850	High
	269.100	High
	316.100	Low: Approach/Departure Services
San Luis Obispo, CA	128.700/307.000	Low
South Lake Tahoe, CA	134.300	Low: Approach/Departure Services
Squaw Valley, CA	127.950	Low: Approach/Departure Services
Tonopah, NV	125.750/284.650	Low
	132.050/273.450	High
Ukiah, CA	119.975	High
	127.800/127.800	Low Discrete: Approach/Departure Services
	132.200/350.300	Low: Approach/Departure Services
	134.975	High
	306.200	High
	379.200	High

State-by-State: Great Lakes

We have two easy states this month and two tough ones. They're also the last four mainland states we'll do. In October we'll move on to Canada.

Michigan:

If 760 is open in your area, then the Motor City's WJR is your Michigan target. The 50,000-watt "Voice of the Great Lakes" is just that. The format is news/talk.

If 760 is not open, don't despair. Two expanded-band stations grace the other side of the state. WDSS-1680 in the Grand Rapids suburb of Ada is a Radio Disney outlet. WQSN-1660 in nearby Kalamazoo seems to "get out" even better; they're ESPN Radio with frequent local ads.

Four other 50,000-watt stations operate in Detroit, but their patterns all aim straight north. If you're in northern Ontario, try for WWJ-950, WDFN-1130, WXYZ-1270, and/or WLQV-1500. Anywhere else (except Detroit) these will be tough catches.

Ohio:

The Buckeye State is even easier. Cincinnati's WLW-700 was North America's most powerful station at 500,000 watts in the late 1930s. At the time, they called themselves "The Nation's Station." To some degree they still are. The fairly open 700 channel and the excellent Midwestern ground conductivity make for a big signal.

Also DXable from Cincinnati is WCKY-1530. The station was once licensed to Covington, Kentucky, across the river; hence the "CKY" call letters. The transmitter is still in the Bluegrass State, but since most DXers count states by city-of-license, we'll still call WCKY an Ohio station. WCKY protects Sacramento's KFBK at night, so Western DXers may have to look elsewhere for Ohio. (Although, since WCKY is allowed to remain non-directional un-

til Sacramento sunset, it may allow some good early-evening DX possibilities out West.)

The state's third 50,000-watt station is Cleveland's WTAM-1100. Like WLW and WCKY, this is a news/talk station. It's also non-directional and audible over most of the East and Midwest. WHKW is Cleveland's 2nd and Ohio's 4th 50,000-watter. It's a religious station and uses a directional antenna that beams all its power north and south.

Should four 50,000-watt targets prove insufficient... Columbus offers two more DXable stations. WOSU-820 is 5,000 watts daytime, but as an NPR affiliate they'll stand out on the AM dial. Also commonly DXable is WRFD, a religious daytime-only operation. They run the rather unusual figure of 23,000 watts.

West Virginia:

Now, we get into the tough ones. West Virginia almost became much tougher when the state's only 50,000-watt station applied to move to a suburb of Akron, Ohio. WWVA-1170's application has since been withdrawn; the powerhouse station will remain in Wheeling. WWVA is directional at night, favoring the east.

Other decent West Virginia DX targets are few and far between. Huntington's WRVC-930 is the most-heard one here. WCHS-580 Charleston may be another good one to try. WCAW-680 is surprisingly rare at sunrise/sunset, given their 10,000-watt daytime signal.

Indiana:

Indiana has two 50,000-watters to choose from. Fort Wayne's WOWO-1190 is probably the easier of the pair, due to their non-directional daytime signal. They used to be 50,000

at night, too – directional to protect a Portland, Oregon, station. But a few years back, New York City's WLIB, also on 1190, arranged for WOWO to reduce nighttime power to 9,800 watts and change their antenna pattern to null in the direction of New York. The move allowed the NYC station to increase power and operate at night. (It had been a daytime-only outlet.) For listeners to the south of Fort Wayne, the change hasn't had much effect, and WOWO is still the easiest way to bag Indiana. If you're east of Fort Wayne, WOWO has become a lot tougher than it used to be. If you're west of Fort Wayne, WOWO's always been tough!

The other 50,000-watter is Indianapolis' WIBC-1070. This station is directional all the time, and favors the southeast. If you aren't on a line from Indianapolis to Charleston, S.C., you're probably going to find WIBC tough. Give them a try anyway...

South Bend is home to the Hoosier State's expanded-band station. WWLV-1620 is widely heard. They're one of the few AM stations still running music, in their case, "Love Songs."

❖ IBOC (and other digital radio) news

Girard Westerburg has done it again... You may remember Girard was the first to log a digital TV station by E-skip when he received PSIP data (a "text ID") from Rapid City, SD, station KOTA-DT channel 2 at his location in Lexington, Kentucky.

Girard has now also become the first DXer to log an IBOC digital radio station via Es. During an intense opening on May 26th, he decoded both the "text ID" and digital audio of KBCO's (Boulder, Colorado) IBOC signal. Two days

BEST BETS

For logging the Great Lakes States

Indiana:

WOWO-1190, WIBC-1070, WWLV-1620

Ohio:

WLW-700, WCKY-1530, WTAM-1100, WHKW-1220

Michigan:

WJR-760, WDSS-1680, WQSN-1660

West Virginia:

WWVA-1170, WRVC-930, WCHS-580, WCAW-680



The 'text ID' for WOWO's IBOC AM digital signal, as received near Nashville by the author; and for FM stations KBCO and KAJA, as received in Lexington, Kentucky, by Girard Westerburg.

later, in another opening, IBOC signals were received from Texas FM stations KAJA and KZPS.

See photos of Girard's FM IDs and my WOWO AM ID in the sidebar.

To my knowledge, no one has yet succeeded in DXing IBOC audio from an AM station. At my location near Nashville, I've received text IDs from two DX AM stations (Fort Wayne's WOWO and San Antonio's WOAI). Who'll be the first to actually get any digital audio?

Canada's CRTC has opened an inquiry into digital radio policies north of the border. Eureka 147 digital radio has been authorized in Canada for years, using frequencies near 1500 MHz. 76 Canadian digital stations are authorized, of which about 50 are on the air. But radios are not selling, and the digital transition is essentially stalled.

The CRTC seems to have concluded that digital radio, as currently implemented, is not going to replace analog. Some of the questions they're asking:

- Should we cease to consider digital a replacement technology? (i.e., should we presume analog radio will be around indefinitely?)
- Should we encourage new stations that don't currently have an analog signal, to sign on as digital operations? (Thus encouraging those stations' audiences to buy digital receivers.)
- Should we allow the use of the U.S. IBOC standard?
- Should we consider other standards (DRM, DVB-H, DMB) for use in Canada?
- What else can we do with the Eureka spectrum?

Ibiquity (among hundreds of other companies and people) have filed interventions in this proceeding.

The (U.S.) National Association of Broadcasters held their annual convention in late April. Rumors were flying, suggesting that the FCC Commissioners had on their desks a final proposal for IBOC rules, including permission for AM IBOC operation at night. Many observers believed these rules would be released during the convention. Somewhat to my surprise, they weren't. They still haven't been released.

❖ EAS False Alarm

This doesn't rise to the level of the 1971 false nuclear attack warning, or February 2005's announcement that the entire state of Connecticut was to be evacuated, but if you lived in Puyallup, Washington, it was just as frightening...

Puyallup operates a low-power emergency radio station on 1580 AM. On May 24, listeners were told Mount Rainier had erupted and caused a massive mudflow, known as a "lahar." Presumably, the mud threatened to bury the town – a disaster that has caused thousands of fatalities overseas. At least two dozen area residents heard the erroneous broadcast.

Fire department officials tell the Associated Press the mistaken message was triggered by a software error, and should be corrected shortly.

❖ One way to start a pirate station...

...is to take over the transmitter of a legitimate operation... As the false lahar alert was being broadcast in Washington State, an unknown intruder commandeered the transmitter of classic rock station WBAB-FM on Long Island. They captured the station just long enough to play a country song with decidedly racist lyrics (including the so-called 'n-word').

Often, a station's transmitter is not in the same place as the offices. Suitable transmitter sites are often in very rural areas, or on high mountaintops. These sites are often not convenient to advertisers. There must be a way for the station to transmit its programs from the offices in town, to the transmitter elsewhere. Methods used include telephone lines, satellite, and even subcarriers of other stations, but probably the most common is a microwave link. These are known as "Studio-Transmitter Links" or "STLs."

The theory here is that someone had a spare transmitter for WBAB's STL frequency. By properly placing that transmitter, they were able to swamp the legitimate WBAB STL transmitter and replace the intended WBAB programming with their own. This kind of thing has happened before. Most famously, the transmitter of WGN-TV in Chicago was taken over to broadcast video of a guy dressed as Max Headroom swatting someone's bare backside.

❖ X-band Activity

Another new X-band station has been authorized in Canada. The station will operate just east of Toronto with 1kW non-directional, fulltime on 1690 kHz. As with other Canadian X-band stations, it will be an ethnic outlet with most programming in Greek. Other languages will include Romanian, Serbian, and Armenian – along with some in English.

When the expanded-band was introduced in the U.S., the theory was that X-band licenses would be valid for five years. At the end of that period, the station would be required to surrender either its X-band license or its regular-band license. This principle does not seem to be well-obeyed, to say the least – many stations seem to have survived the five-year term with both frequencies intact.

Several are, however, now making their decisions. These include WTTM-1680 (which has surrendered WHWH-1350); WWLV-1620 (which has surrendered WHLY-1580); and WJCC-1700 (which has surrendered the 1700 frequency and will remain WNML on 1210).

It's rumored that there is a petition before the FCC to modify the policy and allow X-band stations to keep both frequencies. If approved, I wonder what would happen to those stations that have already surrendered one or the other of their frequencies? Might stations like 920 in Lexington Park, Maryland, or 1370 in suburban Milwaukee come back?

❖ And finally...

I'm sure the name Morris Sorenson is familiar to DXers of all persuasions. Morris was active in shortwave, as well as in AM, FM, and TV. Morris passed away all too soon, at age 59, in Winnipeg in March. Besides his interest in radio, he was both a professional and amateur naturalist who enjoyed showing people the bounty of wildlife amid the bustle of the city. His website www.wilds.mb.ca/urbanat/ has been maintained as a memorial to one of the best-known names in domestic-band DX.

❖ Off the subject, but...

Bob Barker says to have your pet spayed or neutered (and he's right). Doug Smith says don't let your dog run at large. This month's column is being (painfully) typed with only one hand. I broke my collarbone after three dogs, running at large, attacked me while I was bicycling near my home. Attempting to avoid them, I fell off the bike, sustaining the injury. There are many ways to confine your dog to your property (some of them even involve radio!); Please do it. Your neighbors will appreciate the effort.

(If there are any other errors in this month's column, you can blame that on the dogs too...)

❖ 'Till next month

Have you tried DXing IBOC yet? Write me at 7540 Highway 64 West, Brasstown NC 28902-0098, or by email to dougsmith@monitortimes.com. Good DX!

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Aeronautical HF VOLMET – MWARA – LDOC

You can experience the fun and the challenges of the world of distant aeronautical radio communications and broadcasts. It can become a geography lesson as well! Where is Dakar, Comodoro Rivadavia, or Córdoba? How about Guangzhou, Bombay, Lajes, or Diego Garcia? How is the weather in Kuujuaq?

It can be exciting to many radio hobbyists to hear communications directly from an aircraft flying near Asia, Africa, or other distant places – in English.

You can't just turn on your radio and magically expect this to happen. It takes some knowledge and some practice – along with favorable radio propagation conditions which allow these signals to travel great distances. Transmissions from closer to home can be heard by many on a daily basis and that, for some, is a good place to start. Let's explore some of this!

❖ Receivers and Antennas - Briefly

You cannot lick your finger and touch your receiver's antenna terminal and expect to get adequate reception. You really do need an outside wire antenna for best results, and it doesn't have to be fancy or expensive. You need a receiver ranging in quality and capability from a portable that has fairly good single-sideband (SSB) reception and allows the attachment of an external antenna – to an Icom R75 (www.grove-ent.com/ICR75.html). Really, nothing much better than that is needed. So now, it's just a matter of when and where!

❖ Ionospheric Propagation

To receive distant stations requires listening in the right frequency band at the right time of day for your particular location. The right time of day is crucial and relates to the fairly regular twenty-four hour solar effects on the earth's ionosphere and how that favors reception from different parts of the world.

In addition to the daily fluctuations, the varying solar weather affects our ionosphere and is superimposed onto the more predictable twenty-four hour fluctuations. This can either improve or degrade reception. When it all falls together, you can make the catches.

To add another complication, there is an eleven-year sunspot cycle that dramatically affects radio propagation, particularly at the mid and higher shortwave frequencies. Unfortunately, we are near the bottom of the cycle now,

but the good news is that things will improve over the next few years.

Shortwave signals "bounce" between the ionospheric layers and the ground to travel thousands of miles. Throughout the earth's twenty-four-hour day-night cycle, the height and density of the reflective ionospheric layers change. This makes the higher shortwave frequencies go further during the day and the lower frequencies go further at night.

Another factor is Maximum Usable Frequency (MUF). At any given time, short waves above a certain frequency (maximum) can be rather dead and ineffective. So, when a higher frequency band seems to be dead to you, it may be better to drop down to a lower band. Some middle frequency bands will have activity most of the day and night.

After-sunset listening vs. before-sunrise listening can make a world of difference, literally. Early-morning listening favors the western direction. After-sunset listening favors the eastern direction. Experimentation, experience, and note-taking help considerably in learning how propagation affects your reception.

HF Aero Frequency Bands in KHz USB

2850-3155	10005-10100
3400-3500	11175-11400
4650-4750	13200-13360
5480-5730	15010-15100
6525-6765	17900-18030
8815-9040	21850-22000
23200-23350	

❖ The Shortwave Aircraft Bands

Aeronautical transmissions can be found within several frequency ranges, called bands.

The three highest frequency bands are used less often than the others, but your own listening will let you know when and where the activity can be heard. Several types of aeronautical broadcasts and communications can be found within these bands and they will be described below. Military aircraft communications can also be found here, but that is not within the purview of this column.

You can select a band and tune slowly back and forth using the Upper Sideband (USB) mode on your receiver to see what pops up, or you can select specific frequencies to sit on for a period of time.

❖ VOLMET / Aviation Weather

VOLMET (VOL METéorologique) broadcasts provide meteorological information for aircraft in flight and are geography-intensive for the dedicated listener. They serve as good targets for DX (long distance) reception since they are transmitted from many areas of the world day and night. VOLMET transmissions can also serve as propagation beacons to various world areas.

The aeronautical contraction "SIGMET," mentioned below, means "SIGNificant METeorological information" (hazardous weather that could affect the safety of aircraft in flight). More SIGMET info can be found at: <http://products.weather.gov/PDD/SIGMET.pdf>

Each VOLMET frequency incorporates a set list of transmitting stations for a specific geographic area. Each one of the stations transmits on a published schedule in a time slot starting at a certain number of minutes past the hour and ending before the next station in the sequence begins.

If within a written VOLMET broadcast schedule you see "H+15-20," this means that the broadcast starts at 15 minutes past the hour and lasts until 20 minutes past the hour. If it is stated simply as "H+45," as an example, it means that it starts at 45 minutes after the hour.

For U.S. listeners, good starting points for VOLMET broadcasts are "New York Radio" and "Honolulu Radio." The following quoted schedules are courtesy of the Federal Aviation Administration (FAA).

NEW YORK RADIO

The New York frequencies in kHz USB are: 3485 (broadcasts from 1 hour after sunset to 1 hour before sunrise), 6604, 10051, and 13270 (broadcasts from 1 hour before sunrise to 1 hour after sunset).

- H+00-05; Aerodrome Forecasts, Detroit, Chicago, Cleveland. Hourly Reports, Detroit, Chicago, Cleveland, Niagara Falls, Milwaukee, Indianapolis.
- H+05-10; SIGMET, (Oceanic-New York). Aerodrome Forecasts, Bangor, Pittsburgh, Charlotte. Hourly Reports, Bangor, Pittsburgh, Windsor Locks, St. Louis, Charlotte, Minneapolis.
- H+10-15; Aerodrome Forecasts, New York, Newark, Boston. Hourly reports, New York, Newark, Boston, Baltimore, Philadelphia, Washington.
- H+15-20; SIGMET (Oceanic-Miami/San Juan). Aerodrome Forecasts, Bermuda, Miami, Atlanta. Hourly Reports, Bermuda, Miami, Nassau, Freeport, Tampa, West Palm

- Beach, Atlanta. H+30-35; Aerodrome Forecasts, Niagara Falls, Milwaukee, Indianapolis. Hourly Reports Detroit, Chicago, Cleveland, Niagara Falls, Milwaukee, Indianapolis.
- H+35-40; SIGMET (Oceanic-New York). Aerodrome Forecasts, Windsor Locks, St. Louis. Hourly Reports, Bangor, Pittsburgh, Windsor Locks, St. Louis, Charlotte. Minneapolis.
 - H+40-45; Aerodrome Forecasts, Baltimore, Philadelphia, Washington. Hourly Reports, New York, Newark, Boston, Baltimore, Philadelphia, Washington. Aerodrome Forecasts, Nassau, Freeport. Hourly Reports, Bermuda, Miami, Nassau, Freeport, Tampa, West Palm Beach, Atlanta.

On the same frequencies as New York Radio, you will also find "Gander Radio" at H+20-30 and H+50-60.

HONOLULU RADIO

Honolulu Radio frequencies are 2863, 6679, 8828, and 13282 kHz USB.

- H+00-05 and H+30-35; Aerodrome Forecasts, Honolulu, Hilo, Agana, Honolulu. SIGMET. Hourly Report, Honolulu, Hilo, Kahului, Agana, Honolulu.
- H+05-10 and H+35-40; Hourly Reports, San Francisco, Los Angeles, Seattle, Portland, Sacramento, Ontario, Las Vegas. SIGMET. Aerodrome Forecasts, San Francisco, Seattle, Los Angeles.
- H+25-30 and H+55-60; Hourly Reports, Anchorage, Elmendorf, Fairbanks, Cold Bay, King Salmon, Vancouver. SIGMET. Aerodrome Forecasts, Anchorage, Fairbanks, Cold Bay, Vancouver.

On the same frequencies as Honolulu Radio, you also will find Tokyo at H+10 and H+40, Hong Kong at H+15 and H+45, and Auckland at H+20 and H+50.

CanForce (Canadian Armed Force) aviation weather reports and terminal forecasts via "Trenton Military" on 6754 and 15034 kHz USB are other relatively easy targets for U.S. and Canadian listeners. Various Canadian cities are also listed in a set order and on a set schedule.

For a nice world VOLMET frequency list, please see: www.dxinfocentre.com/volmet.htm

For city lists by world areas, please see: www.dxinfocentre.com/volmet-wx.htm

To decode the three-letter country codes at this site, see <http://worldatlas.com/aatlas/cty-codes.htm>

❖ MWARA – Transoceanic Communications

Aircraft flying over the oceans beyond about 250 miles from land cannot communicate with land stations using the 118-136 MHz aircraft band and must use shortwave / HF frequencies which can travel from hundreds to thousands of miles.

The world is divided up into "Major World Air Route Areas" (MWARAs). Each area has its set(s) of HF frequencies. The purpose is for air traffic control communications and for transoceanic aircraft to announce reporting points for safety and tracking along their established routes. You will also routinely hear SELCAL

(SElective CALLing) tones. The ground stations use the tones to open the squelch of the receiver of a specific airliner that they wish to contact so the flight crew does not have to listen to all the other communications and static on frequency.

Aircraft over the Eastern Pacific, bordering the U.S.-Canadian West Coast and up through southern Alaska, communicate with the Aeronautical Radio, Inc (ARINC) Communications Center located near Livermore, California, with the radio ID of "San Francisco" – even when an aircraft may be flying to or from Los Angeles or Seattle, for example. ARINC is a company contracted to provide these communications services for the FAA. Here are some starter frequencies for the Eastern Pacific area:

Central East Pacific One Network				
3413	3452	5574	6673	8843
10057	13354	KHz USB		

Central East Pacific Two Network				
2869	5547	11282	13288	
21964	KHz USB			

Aircraft over the Atlantic that communicate with the U.S. for ATC purposes, do it via the ARINC Communications Center located at New York (Long Island MacArthur Airport) and with the radio ID of "New York." This is the case even when aircraft are not departing from or arriving at New York. The ARINC ground operators relay information and requests back and forth between FAA Air Traffic Controllers and the aircraft. Here are starter frequencies for the Atlantic area:

North Atlantic Family A Network				
3016	5598	8906	13306	
17946	21964	KHz USB		

North Atlantic Family E Network				
2962	6628	8825	11309	
13354	17952	KHz USB		

To get a visual idea of these MWARAs, you can download the Pacific and Atlantic/Caribbean maps. Each is in PDF format and 2.5MB in size – a little slow at dial-up speeds but worth it. They can be saved to your hard drive for future reference. Go to www.arinc.com/products/voice_data_comm/air_ground_radio_svc/jepp_charts.html and select "ARINC-3" for Atlantic/Caribbean coverage and "ARINC-4" for Pacific coverage.

For nice lists of worldwide MWARA frequencies, go to www.flightradio.com/hf.htm and to www.canairradio.com/hf.html

MWARA REGION ABBREVIATIONS			
NAT	North Atlantic	CAR	Caribbean
SAM	South America	SAT	South Atlantic
AFI	Africa	INO	Indian Ocean
MID	Middle East	EUR	Europe
NCA	N. Central Asia	EA	East Asia
SEA	South East Asia	CEP	Central East Pacific
NP	North Pacific	SP	South Pacific
	CWP	Central West Pacific	

A letter or a number after an abbreviation indicates a subgroup of frequencies within a specific overall area. "CEP-1/2," for example is a list combining area CEP-1 and area CEP-2 frequencies. Viewing the PDF maps, mentioned above, will make this clearer.

You may also encounter the term "RDA-RA." It stands for Regional and Domestic Air Route Area. RDARAs are smaller and more localized than the MWARAs and can make challenging DX targets. See the aerolista.txt link below.

❖ LDOC

Long Distance Operational Control (LDOC) communications can be routine or they can be interesting and suspenseful and occasionally develop into a real drama. These are not ATC frequencies. They are more like the "Company" frequencies that can be found in the 128.825-132.0 MHz VHF aircraft band but are used on oceanic flights when out of VHF range.

COMMON LDOC FREQS			
3494	6640	8933	10075
11342	13348	17925	KHz USB

The large list via this next link includes more distant LDOC (and many other aero) frequencies worldwide – dated 2002: www.fernandocasanova.com/ea1uro/aerolista.txt

The facilities that handle LDOC communications are called Long Distance Operational Control Facilities (LDOCF). Sometimes operators on the MWARA frequencies will ask an airliner to go to a specific LDOC frequency and you can follow over to that frequency.

The LDOC communications are frequently phone patches (telephone to radio connections facilitated by the LDOCF operators) between flight crews and their company ground personnel. Some may relate to aircraft maintenance or malfunction issues that will need attention upon landing – all the way to In-Flight Emergencies (IFEs) requiring real-time troubleshooting and with suggested solutions.

Some communications relate to medical assistance for an in-flight illness or injury. It is not always easy to convey a passenger's or a crew member's difficulties to emergency-care medical specialists on the ground because the info passes from the person attending to the patient, to the aircraft crew member who handles the radio traffic, to the ground specialists, and back again. It can be difficult and time-consuming, and add to that the potential for radio reception difficulties. Yes, there can be drama!

❖ Concluding

Without really knowing what you may find, slowly tune through the aircraft bands at different times during the day and night in the USB mode and you will run into the above types of communications – plus military aero comms – while keeping in mind that some days may be better than others. Be patient, tune carefully, and take notes. See you next time.

Low Band News & Notes

August can be a slow season for longwave monitoring, but this month we have several items of interest from *MT* readers. I am always interested in hearing from readers with loggings, station photos, QSLs or any other LW-related news. You can write to me by e-mail at the address in the masthead, or via regular postal mail.

Doug Robertson (CA) keeps an eye on updates to both maritime and aviation navigation aids. He noted that the Feb. 2006 AOPA Aviation Fact Card lists a total of 1,613 non-directional beacons in the USA among its Aeronautical Facilities statistics for the calendar year 2005. On the maritime front, Doug also forwarded the following *Notice to Mariners* regarding NAVTEX data broadcasts on 518 kHz:

The U.S. Coast Guard, in coordination with the National Weather Service, is proposing to modify the broadcasting of Maritime Safety Information (MSI) via NAVTEX, as detailed below. This change is necessary in order to reduce the potential of delayed or missed broadcasts of MSI due to the large amount of information broadcast within the six daily broadcast slots for each NAVTEX station.

Currently, Meteorological Forecasts are broadcast four times per day and rebroadcast twice per day. Meteorological warnings are broadcast upon receipt and at the next routine scheduled time until canceled. Navigational Warnings are broadcast at the next available broadcast slot and rebroadcast in all subsequent slots as long as they remain in force.

Under the proposed change, Meteorological Forecasts would no longer be rebroadcast. These two time slots would be allocated to rebroadcasts of Navigational Warnings. The proposed elimination of previously broadcast Meteorological Forecasts and reduction in repeated Navigational Warnings will reduce the potential of delayed or missed broadcasts of MSI.

The proposed changes are shown in the table below:

Station	Id	Broadcast Schedule (UTC)
Adak	X	(Broadcast terminated Dec. 1996)
Kodiak, AK	J	0300, 0700, 1100 ¹ , 1500, 1900, 2300 ¹
	X	0340, 0740, 1140 ¹ , 1540, 1940, 2340 ¹
Astoria, AK	W	0130, 0530, 0930 ¹ , 1330, 1730, 2130 ¹
San Francisco	C	0000, 0400 ¹ , 0800, 1200, 1600 ¹ , 2000
Cambria	Q	0045, 0445 ¹ , 0845, 1245, 1645 ¹ , 2045
Marianas	V	0100, 0500 ¹ , 0900, 1300, 1700 ¹ , 2100
Honolulu	O	0040, 0440, 0840 ¹ , 1240, 1640, 2040 ¹

Notes:

¹ Repeated Navigational Warnings and no Weather normally broadcast at these times.

² Kodiak also broadcasts weather forecasts during time slots initially allocated to Adak.

❖ Arizona Loggings

The following logs are from Arthur Gauntt (AZ) who writes: "As an *MT* reader, I would like to share with you my recent beacon loggings as heard from my location in Gilbert, AZ. I am using an Icom IC-R75 receiver that is connected to a LF Engineering Model H-800 active antenna."

Good to hear from you, Arthur, and thank you for an impressive list of loggings.

Freq (kHz)	ID	Location
201	IP	Mobile, AZ
206	GLS	Galveston, TX
220	RBJ	Tucson, AZ
242	EL	El Paso, TX
245	AVQ	Tucson, AZ
247	ILT	Albuquerque, MN
251	AM	Amarillo, TX
275	GUY	Guymon, OK
278	CEP	Ruidoso, MN
281	FFZ	Mesa, AZ
305	RO	Roswell, NM
326	MA	Midland, TX
329	TAD	Trinidad, CO
338	RYN	Tucson, AZ
344	FCH	Fresno, CA
344	GNC	Seminole, TX
350	NY	Enderby, BC
350	RG	Oklahoma City, OK
365	HQG	Hugoton, KS
368	GYM	Guaymas, Mexico
368	SIR	Sinclair, WY
368	SX	Cranbrook, Canada
380	BBD	Brady, TX
382	GRN	Guerrero Negro, Mexico
383	CNP	Chappell, NE
386	SYF	St. Francis, KS
394	ENZ	Nogales, AZ
407	CHD	Chandler, AZ
410	DAO	Sierra Vista, AZ
413	OEG	Yuma, AZ
512	HMY	Muldrow, OK
521	INE	Missoula, MT

❖ Snap, Crackle, Pop

Want to know where lightning is occurring, or has occurred recently? Check out this interesting site forwarded to us by Jacques d'Avignon, VE3VIA (ON): <http://webflash.ess.washington.edu/>

❖ NDBs: Endangered Species?

Dan Wanchic (MN) forwarded an item from the *Federal Register* that could mean significant changes for the LF band. A March 2005 edition of the *Register* announced the proposed cancellation of Instrument Approach Procedures for about 400 non-directional beacons (NDBs) at airports around the U.S.

What is not clear is whether or not the cancellation of *procedures* would lead to a shutdown of the NDBs themselves. (Several of the stations cited in the proposal were still on the air as of the press time for this column – June '06.) It should be no surprise

to anyone that ground-based navigation systems have become less relevant in the age of enhanced GPS. On the brighter side, a loss of these stations could potentially "clean up" the band to allow for some fantastic DX of the signals that remain. More will be reported on this as the facts are learned.

❖ What the Others are Saying

From the *ARRL Letter* comes news of German experimental work being done on 440 kHz. Volume 25, No. 19 of the *Letter* reports the following: Geri Holger, DK8KW/W1KW, in Peine near Hannover, reports that German telecommunication authorities have issued him an experimental license to operate on the "medium wave" frequency of 440 kHz using the call sign DI2BO.

He joins Walter Staubach, DJ2LF, in Dormitz near Nuernberg, who's been operating experimental station DI2AG on 440 kHz. Tests have been under way on that frequency since January 2005, Holger says, "to study the special propagation conditions on medium wave." Holger says CW beacon transmissions (which include call sign and grid square) will be sent on 440 kHz (± 100 Hz), maximum 200 Hz bandwidth at a maximum power of 9 WERP. "Both beacon transmissions will be coordinated in a way so that they can be observed simultaneously to study the propagation from both locations at the same time," Holger explained. "Also, two-way contacts between both experimental stations are planned." Further information is on the DK8KW Longwave Information Web site www.qru.de/di2bo.html.

❖ Virginia Loggings

These nighttime loggings by *MT*'s Ken Reitz (VA) show that you do not need to wait until the middle of winter to have any hope of hearing DX on longwave. The 454 kHz signal Ken reports is believed to be a new DGPS system operating in Maryland (see the June column). The "TST" ID is likely an FAA test beacon that has not yet been formally commissioned. Ken is using a 750-ft Beverage antenna feeding a Kenwood TS-140S transceiver.

Freq (kHz)	ID	Location
77.5	DCF77	Germany
162	LWBC	Allouis, France
183	LWBC	Saarlouis, Germany
198	DIW	Dixon, NC
216	CLB	Carolina Beach, SC
353	TST	Unknown
454	DGPS Pulse	Hagerstown, MD
670	R. Rebelde	Cuba

That's it for August. See you next month!

Court Rules against Radio Free Brattleboro

Radio Free Brattleboro, the longtime unlicensed community voice of Brattleboro, Vermont, has been silenced by a federal court ruling. Despite political support from local government bodies, the court ruled that the FCC has jurisdiction to close down the station. This ruling ends a long conflict between Brattleboro officials and the Federal Communications Commission.

In other enforcement news, the FCC shut down yet another FM pirate in Florida during the late spring. The station in Del Ray Beach operated on 96.1 MHz with a Caribbean music format. According to the *Palm Beach Post*, the alleged operator of this Haitian music station was Phito Thelot.

❖ Pirates Hijack WBAB?

According to the *Billboard* radio trade publication, during mid-May **WBAB-FM**, a commercial rock station on 102.3 MHz FM in Nassau and Suffolk County, New York, was hijacked by an unknown pirate station. Racially offensive lyrics were inserted into the regular audio stream of the station. Station officials have apologized to listeners, but as of press time for *MT*, the guilty parties have not yet been caught. It is possible that these hijinks were internally generated and were not created by a pirate at all, but several mainstream press organizations, including *Newsday*, blamed unknown pirates for this snafu.

❖ Oldest Pirate QSL

MT reader Craig Krist's **Radio Dublin QSL** from November 1981 remains the oldest pirate QSL in our survey of the collections owned by *MT* readers. This month we feature this QSL, which by some DX standards is not that old. But, among pirate radio DXers we still have not yet found an older one.



❖ Norwegian Pirate

Chris Lobdell checks in this month with a real rarity. He heard **Fox 48** on 6306 kHz at

2315 UTC on May 3. The operator of this one says that they are currently the *only* shortwave pirate station operating from Norway. They use a 300 watt transmitter, so DXers on the east coast of North America may wish to try for this one around sunset on weekends. The station is anxious to receive reception reports at their radiofox48@hotmail.com e-mail address.

❖ KCBM Operator Passes

According to the IRCA list, Barry Strange, the longtime operator of **KCBM** passed away on Sunday, May 28. *Monitoring Times* magazine sends sincere condolences to his family and friends. This west coast pirate had been active since 1991 on 7440 kHz, and more recently on 6990 kHz. The station had used kcbm_2@hotmail.com as a correspondence address.

❖ Correction

As a result of a layout error, the June 2006 edition of the *Outer Limits* did not appear in the magazine. But, that unprinted column is available for free download on the internet as a .pdf file. The article is available at the www.monitoringtimes.com/html/mtouter0606.pdf URL. *Monitoring Times* regrets this error.

❖ What We Are Hearing

Monitoring Times readers heard almost twenty different North American pirates this month. You can hear them, too, if you use some simple techniques. Pirate radio stations never use regularly announced schedules, but shortwave pirate broadcasting increases noticeably on weekends and major holidays. In the United States, Labor Day will be the next upcoming major holiday under this definition. You sometimes have to tune your dial up and down through the pirate radio band to find the stations, but more than 95% of all North American shortwave pirate broadcasts are heard on 6925 kHz, plus or minus 30 or 40 kHz.

Captain Morgan- Here's another one that mixes rock music and Twilight Zone television audio. (None, says to send loggings to the Free Radio Network web site, and has QSLed lately)

Channel Z Radio- Their rock music productions hit the ionosphere both from North America and from Europe. (Blue Ridge Summit)

Ground Zero Radio- Their pirate shows are allegedly transmitted from an old ICBM missile silo. (Elkhorn)

James Bond Radio- Guess which spy movie character dominates the music on this pirate? (None)

KIPM- Despite prior on-air announcements that the station might cease program production, Alan Maxwell's existential pirate remains on the air with

his "Illuminati" slogan. (Elkhorn)

Lizard King Radio- This one appeared during the summer with a relay of an old Jim Morrison concert by the Doors. (None)

MAC Shortwave- Paul Star produces an authentic replica of oldies rock music seasoned with genuine old radio jingles. (Uses macshortwave@yahoo.com e-mail)

North Woods Radio- Their normal format is rock music, comedy, and animal sound effects from out in the woods. (Uses northwoodsradio@yahoo.com e-mail)

Pirate Radio Boston- The New England orientation in this station is evident both in the station name and in their rock music playlist. (Stoneham)

Radio First Termer- This documentary about rock music broadcasts to American troops during the Vietnam during the war has added a new segment for current troops in Iraq. (None)

Radio Stickman Shortwave- This new one programs a mix of rock, country, and rockabilly oldies tunes, with Three Stooges comedy mixed in. (None yet)

The Crystal Ship- The Poet's leftist political commentary on "Voice of the Blue States Republic" still uses 6875 kHz and other variable frequencies such as 1710, 3320, 6854, 6925, and 9057 kHz. You have to tune around to find him. (Belfast and uses tcsshortwave@yahoo.com e-mail)

Undercover Radio- Dr. Benway is still very active "from the middle of nowhere." He plays rock music and discusses pirate radio history. (Merlin and uses undercoverradio@mail.com e-mail)

Voice of Captain Ron Shortwave- Captain Ron normally mixes rock music with audio from old TV shows such as the Twilight Zone. (Uses captainronswr@yahoo.com e-mail)

Voice Of Mike Gaukin- This relatively new one features rock music and comedy, sometimes via a **WBNY** relay. (Announced addresses have been invalid)

WBMR- This station has been verifying lately via their e-mail address for their country music and comedy broadcasts. (Uses WBMRradio@hotmail.com e-mail)

WBNY- Commander Bunny's clandestine parody as the rodent revolution movement normally combines yodeling, Easter music (in and out of season), and digital slow scan TV broadcasts. (Belfast)

WHYP- James Brownyard may be on vacation for the summer. We had fewer logs of this one this month than in any other period for the last couple of years. (Belfast and uses whypradio@gmail.com e-mail)

WMPR- Their "dance party" techno music format is easy to spot on the pirate bands. (None; has QSLed only at the Winter SWL Festival)

❖ QSLing Pirates

Reception reports to pirate stations require three first class stamps for USA maildrops or \$2 US to foreign locations, especially in Europe where the value of the US dollar has plunged considerably. The cash defrays postage for mail forwarding and a souvenir QSL to your mailbox. Letters go to these addresses, identified above in parentheses: PO Box 1, Belfast, NY 14895; PO Box 109, Blue Ridge Summit, PA 17214; PO Box 69, Elkhorn, NE 68022; PO Box 146,

Continued on page 61

Amateur Radio Synergy

I think one of the things that keeps me going in ham radio would be the way it converges with other technologies to create entirely new ways of both having fun and performing service. So, this month we will take a look at that and also bounce around a few ideas that have surfaced from e-mails that have come my way.

❖ No Matter Where You Go, There You Are

Recently, I took advantage of a local electronics store's closeout price on a low cost GPS receiver. In case you have been living deep in a cave somewhere (perhaps one of the few places GPS might not work) GPS stands for the Global Positioning System. This is a network of satellites, originally placed in orbit for military purposes, that now pay an enormous peace dividend through their role in navigation. With a simple handheld GPS receiver, it is possible to obtain your location on good old planet Earth down to about 10 feet or less. Not too shabby, when you think of all the compass and map work the same process used to take.

As the result of playing with this new high tech toy, my significant other and I became very interested in the sport of Geocaching. A sort of high tech treasure hunt, the basics would take longer than this column to explain fully, but I would direct you to the Web page www.geocaching.com for the full story. Anyway, I wasn't all that surprised to find that a lot of ham radio folks were involved in the Geocaching world. These folks find all sorts of uses for GPS receivers. Beyond basic location information, they are often used in hidden transmitter hunting, emergency service support work, even in telling your buddy the exact place to go to locate a rare piece of gear at a hamfest.

But the real excitement comes when the synergy bug bites. This happens when hams start connecting their GPS receivers to their amateur radio transceivers. Most often, this is done using the APRS operating standard. APRS stands for the Automatic Position Reporting System, initially developed in the early 1990s by Bob Bruninga WB4APR.

APRS is a real time digital communications protocol that allows ham stations utilizing packet radio to share information that includes, among other things, data fed into the system about a station's location. This can be either the coordinates of a fixed based

station entered once, or a periodically updated location of a mobile station operation.

It wasn't too long after Bob developed the standard that the prices of GPS gear started to get down to the level where mere mortals could afford a receiver without needing to sell their first born. So very early on in the packet radio movement, folks were experimenting with interfacing GPS gear into the APRS system. See www.aprs.org for more details on this fascinating mode of digital communication.

Initially this process was a bit kludgy. Folks would have to enter the coordinates via keyboard for them to appear on the APRS net. But it wasn't long before folks started getting their packet gear talking directly to their GPS units by way of the NEMA 0183 communications protocol. From that point on, it was smooth sailing in terms of turning your position information into something useful in the ham radio world. Miniature dedicated packet controllers came into being, such as the Byonics Tinytrack (www.byonics.com) that allowed for compact installations. Even dedicated amateur radio transceivers came onto the market in the form of the Kenwood TH-D7AG that had built-in packet/APRS capability.

As some of you know from past articles I have written, one of my personal synergistic ham radio efforts involves using amateur radio on my long distance bicycle rides. Often, I do these rides in support of various charities. Utilizing the GPS/APRS capabilities of my equipment, I can allow folks who have contributed to the particular cause follow my ride via a web site that plots my exact location throughout the event.

❖ Where Are All the ATV Operators?

So we know that APRS really took off when the cost of the GPS gear became less prohibitive. That got me thinking about something I've meant to look into for quite awhile. The Home Video boom has come and essentially gone (or at least become very small with the advent of the new digital recording equipment). When my significant other takes me along as a beast of burden on her flea market excursions, I always seem to find one or two large format home video cameras that can be had for a song.

As I recall from the days when I was totally wet behind my ham radio ears, the main

reason folks shied away from playing with "Fast Scan" ATV was the prohibitive cost of camera gear. Twenty or so years ago the cost of a video camera eclipsed the cost of the radio gear associated with getting a signal out on the air. This is no longer the case by any means.

Further food for thought: The 70 cm ATV band more or less corresponds with channels 57 through 61 on any low-cost cable-ready TV set. You may even be able to monitor your local ATV activity by simply connecting such a TV set-up to a good 70 cm outside antenna. Further still, it looks like the major challenge in making ATV work well is learning to overcome feedline losses and maximizing antenna gain. Mastering these skills would have additional application in your other forays into the VHF/UHF spectrum.

Most major metropolitan areas have one or more ATV repeater system up and running. This seems to me to be a prime area for experimentation. So much so that I am thinking of digging my long unused video camera out of the closet and seeing what I might do to get this ball rolling. If I have any level of success (or even failure, because that makes good copy, too) I will share it with you loyal readers. Maybe synergy can strike twice in the same ham shack.

❖ To Dual Band or Not to Dual Band, That Is the Question

I don't think a month goes by where I don't get an e-mail or two asking me about the pluses and minuses of buying a dual band (2 meter/70 cm) handheld as a first rig. It should be no surprise to any of you that my feelings on this subject wax and wane.

The obvious advantage is you can get access to two chunks of the amateur radio spectrum, usually for a lot less money than purchasing separate units. Add in the fact that many of these modern dual band rigs also sport significantly extended receive capability well beyond the two ham bands and it would seem like a no brainer, right?

Well... Let's look at this from another angle. A dual band rig does certainly represent the basic concept of "putting all of your eggs in one basket." And we all know what the Old Wives say about such things, don't we? If the radio breaks, you are off the air. If you have two radios, you can usually soldier on with one while the other goes into the shop.

Personally, I've gone a long way down both paths. I have had two radios and found that to have certain advantages in the tactical emergency environment. My group would routinely run the primary net on 2 meters and peel off special operations to the 70 cm repeater. While most newer dual banders allow for receiving two signals at once, it can be a bit confusing. By physically separating the units, I found it was easier for me to follow what was going on with both bands. A lot of trouble is caused in emergency situations by misunderstanding, so, in the working emergency environment, I like separate set ups.

But in the non-emergency environment, I don't like the pull on my belt loops of multiple radios. A single small dual band transceiver is usually what you will see me carrying as I move through my day. I find that, by setting the memory scan function up so my chosen frequencies on each band are interleaved (2 meter, 70 cm, 2 meter, 70 cm, etc) I don't miss much. Just my personal way of doing business.

The one other factor that you may want to consider is the general level of activity in your area. Sure, there are a lot of repeaters out there. But, while some are active, some have dust caked on their finals. If activity in your area leans in one direction or the other, you may be content with a single band transceiver.

❖ Mobile or Handheld, What Is a Ham to Do?

The other question that passes my way amongst the requests about dual band rigs would be, "Should I buy a handheld or a dash mounted transceiver?" Lots of possibilities here, but I would probably lean toward saying the best answer is both. Handhelds are great in any environment where 5 watts or so will

nailed either the repeater or the net control station in an emergency. Since I live within the footprint of all my favorite local repeaters, I seldom have the need to turn on my more powerful 45 watt mobile rig. But when I travel out of my local area, or when I am doing serious emergency operations, I want the added advantage that extra power gives me.

What's that? You say you want to avoid the expense of two radios that accomplish essentially the same purpose? Not to worry, I operated for many years with a 2 meter handheld transceiver that got a boost from a 50 watt amplifier stuffed in my trunk when I was on the road. This method of operation seems to have fallen out of favor in recent years, but I can assure

you it is a more than adequate way to get the best of both worlds at a much more reasonable price. For example, Mirage Communications (a subsidiary of MFJ Communications) sells a 35 Watt 2 meter amplifier that only requires 2 watts of drive for under \$89.95. Not a bad way to boost the power of your handheld at home or in your car. They have many other similar units listed on their Web site at: www.mfjenterprises.com/mirageamp/index.php

❖ Things to Do in August

Late summer is a great time to get out and give your entire antenna system a complete inspection. The world swivels on its axis and we are only a few short weeks from encountering weather that might make climbing up on a roof or a tower a losing proposition. Assuming you are encountering balmy days without a sign of thunder clouds in the sky, don your safety gear and get up in the air to make sure all your sky wires are in good working condition for the upcoming winter DX chases.

Remember, too, that it was around this time last year when ham radio operators all around the country gave good service in support of the victims of various hurricanes. While I write this at the start of the annual hurricane season, with nary a named storm in sight, by the time you read these words we will unfortunately all likely have the opportunity to do our part once again. Remember to abide by any net procedures that rise out of such emergencies. Amateur Radio always shows its best to the world in times of trouble. I know we'll all be there to help once again.

Meanwhile, I'll see you all at the bottom end of 40 meters.

Outer Limits continued from Page 59

Stoneham, MA 02180; and PO Box 293, Merlin, Ontario N0P 1W0.

Some pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. The best bulletin for submitting pirate loggings with a hope that pirates might QSL is now the e-mailed *Free Radio Weekly* newsletter, still free to contributors via yukon@tm.net. A few pirates will sometimes QSL reports left on the Free Radio Network web site, at www.frn.net. Unfortunately, *The ACE* is now defunct.

❖ Thanks

Your loggings and news about unlicensed broadcasting stations are always welcome via 7540 Highway 64 W, Brasstown, NC 28902, or via the e-mail address atop the column. We thank this month's valuable contributors:

Dave Balint, Wooster, OH; Kirk Baxter, North Canton, OH; Jerry Berg, Lexington, MA; Artie Bigley, Columbus, OH; Ralph Brandi, Middletown, NJ; Jerry Coatsworth, Merlin, Ontario; Gerry Dexter, Lake Geneva, WI; Bill Finn, Philadelphia, PA; John M. Fisher, North Chelmsford, MA; Harold Frodge, Midland, MI; William T. Hassig, Mt. Prospect, IL; Harry Helms, Smithville, TX; Don Jensen, Kenosha, WI; Kraig Krist, Manassas, VA; Harald Kuhl, Germany; Ed Kusalik, Coaldale, Alberta; Chris Lobdell, Stoneham, MA; Greg Majewski, Oakdale, CT; Larry Magne, Penn's Park, PA; Dan Malloy, Everett, MA; John Poet, Belfast, NY; Martin Schoech, Eisenach, Germany; John Sedlacek, Omaha, NE; Lee Silvi, Mentor, OH; Joe Wood, Greenback, TN, and an anonymous contributor.

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Kevin Carey
P.O. Box 56, W. Bloomfield, NY 14585



The Kenwood TH-D7AG handheld is APRS ready and able to directly interface with compatible GPS receivers.

UNCLE SKIP'S CONTEST CALENDAR

10-10 Int. Summer SSB Contest
August 5 0000 UTC - August 6 2359 UTC

European HF Championship
August 5 1200 UTC - 2359 UTC

North American QSO Party (CW)
August 5 1800 UTC - August 6 0600 UTC

ARRL UHF Contest
August 5 1800 UTC - August 6 1800 UTC

Maryland-DC QSO Party
August 12 1600 UTC - August 13 0400 UTC
August 13 1600 UTC - 2400 UTC

North American QSO Party (SSB)
August 19 1800 UTC - August 20 0600 UTC

New Jersey QSO Party
August 19 2000 UTC - August 20 0700 UTC
August 20 1300 UTC - August 21 0200 UTC

Ohio QSO Party
August 26 1600 UTC - August 27 0400 UTC

Hawaii QSO Party
August 26 0700 UTC - August 27 2200 UTC

Kentucky QSO Party
August 27 1600 UTC - August 28 0400 UTC

Antenna Wisdom from a Classic

This month we'll cover some antenna lore gleaned from a classic antenna book: *Radio Antenna Engineering*, by Edmund A. Laporte. Apart from the fact that the book contains a lot of useful and interesting information, one reason I chose to discuss it this month is that it is available free on the web. You can download your own copy, and read more of what it offers for yourself at: <http://snulbug.mtview.ca.us/books/RadioAntennaEngineering/> Or, you can get a reprint of the book for \$16.03 plus shipping from: www.lulu.com/content/159004 Sorry, they don't sell by regular mail.

Although Laporte's is an engineering text, it contains much that is practical and understandable to non-engineers. So if you're not swift on mathematics, don't worry: you can skip the math it offers and the parts that use technical terms you don't understand. You'll still find a lot of practical information on the design and utilization of antennas in radio communications. Figure 1 shows the frequencies covered by the book, and the prevalent kind of radio wave propagation on those bands.

❖ Laporte starts with Low Frequency

One very desirable feature of the frequencies below 500 kHz is the reliability of communication. Compared to the frequencies of the MF and HF bands, propagation conditions for this band are very stable. Coverage is essentially by ground wave propagation, and so changes in the ionosphere that cause so much variability in radio communication on HF (and to a lesser extent on MF) don't affect LF much at all.

One problem is that received noise caused by atmospheric static causes serious interference at these lower frequencies. Thunderstorms with their lightning bolts can wreak havoc with reception, and even when no storm is present locally, the noise level on these frequencies can be very high.

A factor that is sometimes an advantage at these lower frequencies is that their waves penetrate water or earth to greater depths than waves of higher frequencies. This makes the use

of underwater or underground antennas practical for some applications.

At these low frequencies, horizontally-polarized components of an antenna's radiation are cancelled or absorbed, and the vertically polarized components propagate as ground waves. Thus, vertically oriented antennas are the rule for these frequencies. For maximum efficiency, the physical length of these vertical antenna elements should be a significant portion of a wavelength: a quarter wavelength or more.

Because the shortest wavelengths in this frequency range are measured in thousands of feet, and the longest in miles, it is not practical to make highly efficient antennas. Even a tower 1000 feet tall would be short, in terms of wavelengths (electrical length), at most of the frequencies in this band. Thus, electrically short antennas must be used. To bring them to resonance, electrical loading is often employed. This includes such devices as conductive top hats and loading coils.

One unfortunate result of the problems just mentioned is that the radiation resistance (the basis of emitting waves) is often much lower than the loss resistances (element resistance, loading-coil resistance, induced losses in nearby conductive objects, etc). Again, this means inefficient antennas. And, while buried radials a quarter wavelength long are practical at MF and HF, the physical length of LF wavelengths makes this difficult, expensive, and impractical at the lower frequencies. Thus, ground return currents are lower and ground losses higher for LF antenna systems. Because of the problems outlined here, essentially all LF transmitting antennas are inefficient, and some very inefficient.

Typically, LF transmitting antennas are non-directional; however, the Beverage and Adcock, both directional, find employment for transmitting and receiving. Loop antennas are often utilized for directional reception.

❖ Medium Frequency

Vertical antennas are also useful on the MF band where the shorter waves make it practical to

construct towers that reach a quarter wavelength in physical height, and even somewhat higher. Thus, efficient antennas can be designed on this and the HF band.

With the presence of sky waves on the MF band, selective fading, caused by interference between sky waves and ground waves, can be a serious problem. The influence of tower height on this fading led to the development of an "ideal-height," fading-prevention tower.

Sky waves occur mainly at night, and this can lead to night-time interference between stations operating on the same frequency, even though they might be hundreds or even thousands of miles apart. To deal with this problem, government regulations have been devised to require some stations to reduce power or stop broadcasting during the night.

Multi-element vertical antenna arrays (beams) have been developed for MF broadcasting. This has resulted in the ability to direct higher levels of signal toward desired receiving populations, and to reduce signal levels in unwanted directions where they would cause interference. As the number of stations on the air continues to grow, this is of obvious importance.

❖ High Frequency

On HF, sky waves become the predominant mode of signal propagation. Experience on this band has led to a number of findings. I'll quickly mention a few.

Wavelengths are shorter on this band, and it is practical to make beam antennas very sharply directive. As the ionosphere changes, signals being received can actually move out of the capture area of a too-sharply-directive receiving antenna, and communication can be lost.

At HF, the activity of various layers of the ionosphere become important, and the effect of sunspot activity is of paramount importance on this sky-wave dominated band. With understanding of these variables, prediction of propagation conditions is both possible and necessary.

Noise is a primary limiting factor in receiving, and high gain, by itself, is of no use in improving reception. However, beams which can reject off-beam noise can improve reception. A number of beams such as long wires, rhombics, Vs, and parasitic-element beams are discussed.

❖ And so

We've quickly sampled some of the useful and important antenna technology from

Band	Frequency Limits	Most Useful
	(Laporte's)	Propagation
Low Frequency Band (LF)	Below 500 kHz	Ground waves
Medium Frequency Band (MF)	200 kHz to 5 MHz	Both ground and sky waves
High Frequency Band (HF)	3 MHz to 40 MHz	Sky waves

Fig. 1. Frequency bands and their most useful propagation mode as given in Laporte's book.

This Month's Interesting Antenna-Related Web site:

Here's a site where you can download a free trial copy of the Supernec antenna modeling program. This lets you check out your antenna ideas before you go to the trouble of building the antenna:
www.supernec.com/downloads.htm

This next site has free ebooks on radio and electronics:

<http://en.wikibooks.org/wiki/Special:Search?search=radio&go=Go>

Underwater and underground antennas are mentioned above. In certain applications where their low sensitivity does not present a problem, these antennas can be quite useful. A plus is that they are more immune to received noise and lightning-induced damage. The following site has a lot of interesting information on the use of underwater and underground antennas in days gone by. It is still valid information.

www.rexresearch.com/rogers/1rogers.htm

This well-done site has three links that lead you to some very interesting information on the history of radio's pioneers:

www.fcc.gov/omd/history/radio/

Another rich source of information on a variety of radio pioneers is:

en.wikipedia.org/wiki/Category:Radio_pioneers

Laporte's book, but there's more to be gleaned from the pages of this classic text if you'd like to take the time to check it over.

❖ On the Funny Side

A woman consulted a psychiatrist about her husband's mental condition.

"Doctor," she said "My husband thinks that he's a satellite dish antenna. Can you help him?"

The good doctor thought it over and said "This is a rare condition, and will be a difficult case to treat. It will take a lot of therapy, but for \$100,000 I think that I can cure him."

The woman thought for a while, and then said: "We really can't afford \$100,000 to cure him, so how much would you charge just to adjust him so that he can get better reception?"

RADIO RIDDLES

Last Month

The riddle was: "The length of the driven element of a Yagi-Uda beam is such that the element resonates at the frequency on which it is designed to operate. The driven elements discussed above are shorter than the reflectors, and longer than the directors. But all the elements are intended to respond to the same frequency, so why are they different lengths?"

Well, early beams of this sort had all elements a half wavelength long and spaced a quarter wavelength from the driven element. However, it was discovered that if the elements are spaced closer together and the length of the reflector and director are adjusted to provide the proper phasing of the signals they radiate to the driven element, then the antenna has more directivity and higher gain. The resulting beams, "super gainers," are also smaller than the original design. Nice!

This Month

Who was or who were the inventor or inventors of the quarter-wavelength vertical antenna discussed above, and of the ever-popular half-wavelength dipole antenna? Why do I group the invention of these two antennas together in this riddle?

You'll find an answer to this month's riddle, another riddle, another antenna-related web site or so, and much more, in next month's issue of *Monitoring Times*. 'Til then, Peace, DX, and 73.

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More on the “Little Fellow” Restoration

In the last issue, we completed the restoration of the Silvertone “Little Fellow” to the point where it came to life and we heard its voice for the first time. There are still some details that need to be handled, but first let’s look at a couple of reader comments received recently by e-mail.

Eric (no last name available) reports that he remembers once using a 75-volt Zener diode in a line cord resistor replacement scheme. The use of a Zener diode would seem to be a neat technique – depending on whether the size needed for the required voltage drop is available. Does anyone else have information on this to share?

David Solliday, WP4IJR, was really taken by the rarity and simplicity of the “Little Fellow” and would like to build a replica using more modern components. He wisely plans to avoid the line cord resistance issue by selecting tubes with a total heater voltage of about 120. Good luck, David! Let us know how you make out.

Now I need to clarify something I mentioned last time. Remember my discussion of the handy line-cord dropping resistor replacement calculator available on a UK site? I said that clicking on the file would open a little Excel spreadsheet window that would do the calculations automatically on your computer. What I didn’t point out is that, in order for this to happen, Microsoft Excel has to be already resident on your computer. Many folks have this as part of the “Microsoft Office Suite” that includes Microsoft word.

❖ The Murky Issue of Volume Control Tapers

At the close of the last column I mentioned a volume control problem that I’d encountered in the little Silvertone. A control of the wrong resistance had been installed in a previous repair and I replaced it with the correct 300k size. However, there was another problem associated with the control that I hadn’t anticipated.

Although the radio was working, the complete range of volume control adjustment, from inaudible to maximum loudness, was taking place in the last one-quarter of the control’s rotation. In fact, I thought my initial post-restoration test of the radio, carried out with the volume control about half-way up, had failed – until I began fiddling with the control.

What is at issue here is the matter of the

taper of the control. The meaning of this term is easy enough to understand. It refers to the rate of change of the resistance measured between the wiper terminal and one end of the resistance element as the control shaft is rotated.

If the resistance changes evenly and uniformly with rotation, we say the control has a *linear taper*. One use for a linear taper control might be to adjust voltage or current in certain parts of an electrical circuit. An *audio*, or *logarithmic*, taper control – as is fairly common knowledge – must be used in volume control applications in order to match the human ear’s perception of the change in sound volume with changes in sound level. Without a logarithmic taper control, the change in sound would not appear to be linear with the rotation of the control shaft.

Beyond these two well-known cases, the issue of volume control taper becomes somewhat murky. I have a fairly good library of radio servicing books, radio texts, and parts catalogues. But nowhere can I find more than brief descriptions of the various tapers and their applications.

The closest I can come is information from the *Official Radio Service Handbook* by J.T. Bernsley, Gernsback Publications, New York, NY 1936. In a section on volume control data, some taper information from the Clarostat Co. is quoted as follows. [I’m sure that the letter designations were assigned by the company and are not universally used. Descriptions are quoted word for word, including capitalization.] Unfortunately, no graphs of the various tapers were given. Can anyone provide more information on taper curves and the theory behind the different types?

“U” taper—Antenna and C bias control for one tube.

“W” taper—Screen Grid and Phonograph Pick-Up control

“Y” taper—Audio shunt control—(Logarithmic taper)

“Z” taper—Audio shunt and tone control.

“T” taper—Antenna and C bias control for 2 tubes.

“V” taper—C bias rheostat.

“S” Linear—Standard potentiometer.

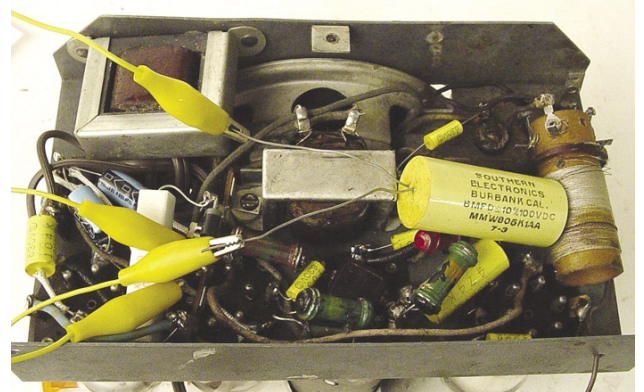
I’m guessing that our volume control should be a “V” taper (whatever that curve looks like). Take a look at the volume control circuit of the “Little Fellow,” which I’m reproducing with this article, and you’ll see that the control does vary the C bias on the screen grid of the type 78 tube and is connected as a rheostat (one end of the resistance element being left free).

If I have such a rare bird as a 500k “V” taper pot in my junkbox, I’m not aware of it. So until one crosses my path, I’ll have to suffer with the potentiometer I originally installed. Perhaps I’ll eventually find the carcass of a similar radio that can be stripped for the part.

Incidentally, the 200-ohm resistor wired between the potentiometer and ground is there to keep the bias from falling to zero when the control is set at a full counterclockwise position.

❖ Testing a Capacitor Line-Cord Replacement

Getting back to the line-cord replacement issue, you’ll recall that our radio is now work-



Capacitor was tested by clip-leading it in place of the diode and resistor (see text).

ing very well using a diode-resistor replacement. But thanks to a good friend who raided his own parts bins, I later received the 8-ufd non-polarized capacitor that the handy UK program had calculated would also serve as a replacement.

I had no desire to try to shoehorn this large part into the tight confines of the radio in place of the already-installed diode and resistor. However, I did want to take the op-

portunity to test, and report on, how well this hard-to-find component would function as a replacement line-cord resistor.

So I simply temporarily disconnected my diode and resistor and ran clip leads to the capacitor, which I left sitting on the chassis. As before, I didn't apply full power immediately, but brought the line voltage up slowly with a Variac while carefully observing the tube heaters. I finally reached full line voltage without incident, at which point the brightness of the heaters looked normal and the radio was working well. The advantage of this approach is that no series power resistor is required, and so there is no extra heat dissipated within the radio.

❖ Cabinet Refinishing

The entire cabinet is now stripped, at least to a first approximation. However, some of that old paint seems to have claws, and pesky specks of it are sticking in difficult to reach places such as the inner surfaces of the speaker grille. On top of that, the original stain has come off, unevenly, along with the paint, creating a blotchy effect. Perhaps a second application of paint remover followed by a gentle sanding (so as not to go through any veneer) will do the trick.

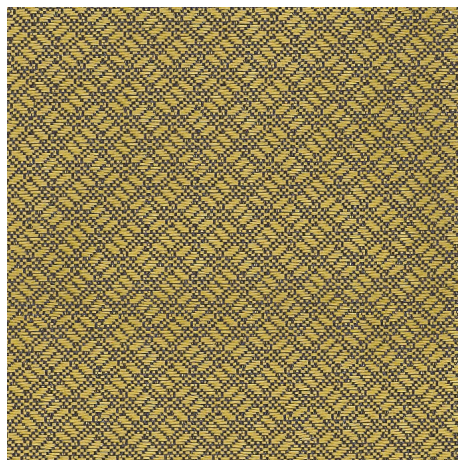


The cabinet is now almost completely stripped, but will need a lot of detail work to make it ready for stain and varnish.

I estimate that it will be at least a long evening's work to prepare the surface for a new application of stain and varnish. Then perhaps much of another evening to apply the stain and varnish and glue in new grille cloth. At any rate, I hope to be able to have the "Little Fellow" back in its refinished cabinet in time to show you pictures next issue.

Speaking of the grille cloth: The original material looked quite intact, but I needed to remove it to avoid damaging it with paint remover. My hope was to remove the cloth undamaged, and I thought I had a pretty good chance of doing that because the old glue was so dried out. However, as will happen, the cloth suffered a nasty tear just as I was releasing the last couple of inches.

What a downer! But after I had the cloth in hand, I realized how dirty it really was and began not to feel so bad about replacing it. Looking through the Radio Daze catalogue



Amazingly, the pattern of the newly-purchased replacement grille cloth was almost identical to that of the 70-year-old original.

(www.radiodaze.com), I saw a basketweave pattern that looked awfully close and ordered it. When I came, I was astonished to see that it was *virtually identical*! According to the description, it was intended for "Emerson, Clarion, etc. cathedrals and table sets."

I'm imagining that, somewhere in this land of ours, the old patterns are still being turned out on vintage machines. Either that, or some clever folks in China or Taiwan have figured out how to reproduce the old patterns on modern equipment.

❖ Other Line Cord Resistor Substitutions

In the "Little Fellow," we needed to work out a line cord resistor substitution that would light two 6-volt and two 25-volt tubes. In the "Equipment Restoration" column of the August 2001 *Old-Timer's Bulletin* (Now *The AWA Journal*), Ken Owens notes other common tube combinations that utilized line cord resistors. These

were identified through a survey of Rider's Manual schematics.

The combinations are listed below, together with the original line cord resistance given in Rider's and – from the Excel automatic calculator – the resistance value and wattage to be used with a series diode.

Tubes	Line Cord Ohms	Resistor W/ Series Diode Ohms	Watts
1-6V+1-12V	330 ohms	223	20.1
4-6V	310 ohms	203	18.3
4-6V+1-12V	270 ohms	163	14.7
4-6V+2-25V	160 ohms	36	3.3

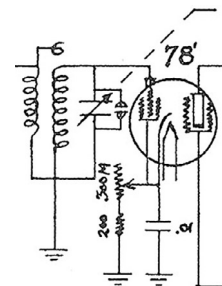
I haven't included data for suggested series capacitors because the values calculated by the program included fractional capacitances that would be very hard to duplicate. I

honestly don't think, all in all, that the series capacitor is the most practical method for voltage dropping, even though it has the undeniable advantage of generating no heat.

Incidentally, in doing the research for this article, I came upon a chart of color codes for various values of resistance line cords. Sometimes it is handy to know what the line cord resistor value is (or was), even though it is not needed in calculating values for a substitute.

Look at the end of the line cord where it enters the set. The two line wires will be either red and blue or red and black. The color of the third, or resistor, wire signifies its value as follows:

Color of Resistance Wire	Resistance In Ohms
yellow	135
blue	160
white	180
green	200
light brown	220
orange	260
grey	290
maroon	315-320
dark brown	350-360



Volume control circuit of the "Little Fellow."

So long for now – see you next month!

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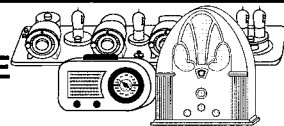
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“Two Tones” continued from page 13

Tone	Grp	Bttn	Des.	Comp./Notes	1036.0	10	A	P12	Plectron	1553.0		R27	Reach/Use	1555.2
712.5	G3	1	G14	GE	1042.5	G2	D	G36	GE	1555.2	10	2	172	Motorola
716.1	Z	7	KZ	QC-I	1047.1	B	A	NB	QC-I	1598.0	10	3	P22	Plectron
725.0			R49	Reach/Use 726.8	1057.5	G2	#	G37	GE	1600.0	1	C	B22	Custom
726.8	5	5	155	Motorola	1061.0			R38	Reach/Use 1063.2	1608.0			R26	Reach Not Sup-
727.5	G1	8	G15	GE	1063.2	3	9	162	Motorola	ported				
732.0	5	#	P04	Plectron	1070.0	6	#	None	Custom	1642.0	10	4	174	Motorola
735.0	4	D	None	Custom	1077.5	G2	*	G38	GE	1650.0	1	D	DQ	Custom
741.3	A	7	KA	QC-I	1082.0	10	B	P13	Plectron	1664.0			R25	Reach Not Sup-
742.5	G1	#	G16	GE	1084.0	Z	B	PZ	QC-I	ported				
746.8	2	5	125	Motorola	1087.5	G3	A	G39	GE	1669.0	11	*	P23	Plectron
749.0	4	*	F03	Federal	1092.4	3	0	189	Motorola	1687.2	10	5	175	Motorola
750.0			R48	Reach/Use 749.0	1098.0			R37	Reach/Use 1102.5	1695.0	3	B	F13	Federal
757.5	G1	2	G17	GE	1102.5	G3	B	G40	GE	1723.0			R24	Reach Not Sup-
765.0	5	*	P05	Plectron	1110.0	4	A	F08	Federal	ported				
767.4	5	6	156	Motorola	1117.5	G3	C	G45	GE	1733.7	10	6	176	Motorola
767.4	B	7	KB	QC-I	1120.0	P2	B	B11	Custom	1743.0	P1	0	P24	Plectron
772.5	G3	2	G18	GE	1122.1	A	B	PA	QC-I	1780.0			F14	Federal Use 1781.5
776.0			R47	Reach Not Sup- ported	1122.5	6	0	190	Motorola	1781.5	10	7	177	Motorola
					1130.0	10	C	P14	Plectron	1784.0			R23	Reach Use 1781.5
787.5	G2	2	G19	GE	1132.5	G3	D	G46	GE	1800.0	1	#	None	Custom
788.5	2	6	126	Motorola	1137.0			R36	Reach Not Sup-	1820.0	P1	1	P25	Plectron
794.3	Z	8	LZ	QC-I	ported					1830.5	10	8	178	Motorola
799.0	6	A	P06	Plectron	1147.5	G3	#	G47	GE	1847.0			R22	Reach Not Sup-
802.5	G1	3	G20	GE	1153.4	6	1	191	Motorola	ported				
804.0			R46	Reach/Use 802.5	1161.4	B	B	PB	QC-I	1881.0	10	9	179	Motorola
810.0			F04	Federal/Use 810.2	1162.5			G48	GE/Use 1161.4	1901.0	P1	2	P26	Plectron
810.2	5	7	157	Motorola	1170.0	10	*	None	Custom	1912.0			R21	Reach Not Sup-
817.5	G3	3	G21	GE	1177.0			R35	Reach/Use 1177.5	ported				
822.2	A	8	LA	QC-I	1177.5	G3	*	G49	GE	1926.0	2	*	F15	Federal
825.0	4	#	None	Custom	1180.0	10	D	P15	Plectron	1930.2	11	0	200	Motorola
832.0			R45	Reach/Use 832.0	1185.2	6	2	192	Motorola	1950.0	1	*	None	Custom
832.5	2	7	127	Motorola	1190.0	A	C	B12	Custom	1980.0			R20	Reach/Use 1985.0
832.5	2	7	G22	GE	1192.5	G1	A	G50	GE	1985.0	P1	3	P27	Plectron
834.0	6	B	P07	Plectron	1201.0	3	*	F09	Federal	1989.0	11	1	201	Motorola
847.5	G1	4	G23	GE	1207.5	G2	B	G51	GE	2043.8	11	2	202	Motorola
851.1	B	8	LB	QC-I	1217.8	6	3	193	Motorola	2049.0			R19	Reach Not Sup-
855.5	5	8	158	Motorola	1219.0			R34	Reach/Use 1220.0	ported				
862.0			R44	Reach/Use 862.5	1220.0	P2	0	B02	Custom	2073.0	P1	4	P28	Plectron
862.5	G3	4	G24	GE	1232.0	10	#	P16	Plectron	2084.0	2	#	F16	Federal
871.0	6	C	P08	Plectron	1251.4	6	4	194	Motorola	2094.5	11	3	203	Motorola
877.0			F05	Federal/Use 877.5	1261.0			R33	Reach Not Sup-	2100.0	B	*	None	Custom
877.5	G2	4	G25	GE	ported					2121.0			R18	Reach Not Sup-
879.0	2	8	128	Motorola	1265.0	A	D	B14	Custom	ported				
881.0	Z	9	MZ	QC-I	1280.0	11	#	None	Custom	2155.6	11	4	204	Motorola
892.0			R43	Reach/Use 892.5	1285.8	6	5	195	Motorola	2164.0	P1	5	P29	Plectron
892.5	G1	5	G26	GE	1287.0			P17	Plectron/Use 1285.8	2196.0			R17	Reach Not Sup-
900.0	5	A	None	Custom	1291.4	A	#	B03	Custom	ported				
903.2	5	9	159	Motorola	1299.0	3	#	F10	Federal	2212.2	11	5	205	Motorola
907.5	G3	5	G27	GE	1306.0			R32	Reach Not Sup-	2250.0	Z	D	None	Custom
910.0	6	D	P09	Plectron	ported					2255.0	2	D	F17	Federal
912.0	A	9	MA	QC-I	1320.0			B15	Custom Not Sup-	2260.0	P1	6	P30	Plectron
922.5	G2	5	G28	GE	ported					2271.7	11	6	206	Motorola
923.0			R42	Reach/Use 922.5	1321.2	6	6	196	Motorola	2274.0			R16	Reach/Use 2271.7
928.1	2	9	129	Motorola	1344.0	11	A	P18	Plectron	2334.6	11	7	207	Motorola
937.5	G1	6	G29	GE	1352.0			R31	Reach/Use 1355.0	2354.0			R15	Reach Not Sup-
944.1	B	9	MB	QC-I	1355.0	A	*	B16	Custom	ported				
949.0			F06	Federal/Use 949.5	1357.6	6	7	197	Motorola	2361.0	P1	7	P31	Plectron
949.5	4	C	None	Custom	1395.0	6	8	198	Motorola	2401.0	11	8	208	Motorola
950.0			P10	Plectron/Use 949.5	1400.0	B	C	B17	Custom	2437.0			R14	Reach/Use 2440.0
952.5	G3	6	G30	GE	1400.0	B	C	R30	Reach	2440.0	2	C	F18	Federal
953.7	3	5	160	Motorola	1403.0	11	B	P19	Plectron	2465.0	P1	8	P32	Plectron
956.0		R41	Reach	Not Supported	1405.0	3	D	F11	Federal	2468.2	11	9	209	Motorola
967.5	G2	6	G31	GE	1430.5	B	D	B07	Custom	2523.0			R13	Reach Not Sup-
977.2	Z	A	NZ	QC-I	1433.4	6	9	199	Motorola	ported				
979.9	3	6	130	Motorola	1449.0			R29	Reach/Use 1450.0	2575.0	P1	9	P33	Plectron
982.5	G1	*	G32	GE	1450.0	B	#	B18	Custom	2612.0	Z	#	R12	Reach
990.0			R40	Reach/Use 992.0	1465.0	11	C	P20	Plectron	2640.0	2	B	F19	Federal
992.0	6	*	P11	Plectron	1472.9	10	0	170	Motorola	2688.0	P1	A	P34	Plectron
997.5	G2	A	G33	GE	1500.0	1	A	B20	Custom	2704.0			R11	Reach Not Sup-
1006.9	3	7	161	Motorola	1500.0	1	A	R28	Reach	ported				
1011.6	A	A	NA	QC-I	1513.5	10	1	171	Motorola	2807.0	P1	B	P35	Plectron
1012.5			G34	GE Use 1011.6	1520.0	3	C	F12	Federal	2840.0	G2	3	None	Custom
1025.0			R39	Reach/Use 1025.0	1520.0	3	C	B09	Custom	2856.0	2	A	F20	Federal
1026.0	4	B	F07	Federal	1530.0	11	D	P21	Plectron	2932.0	P1	C	P36	Plectron
1027.5	G2	C	G35	GE	1550.0	1	B	B21	Custom	3062.0	P1	D	P37	Plectron
1034.7	3	8	131	Motorola	1550.0	1	B	CQ	Custom					

MT REVIEW

A Tough Act to Follow Comparing the ICOM PCR1000 to the PCR1500 & PCR2500

By John F. Catalano

Last month we took a first look at ICOM's new IC-PCR1500 computer controller receiver and its standalone front-paneled sibling the IC-R1500. This time we'll draw some interesting comparisons between the 1500 and its "ancestor," the PCR1000.

In the interim, ICOM has launched yet another computer controlled receiver, the IC-PCR2500. Like the 1500, it also comes in a standalone, "no computer needed" version. We actually used a PCR1500, but did not have our hands on a 2500.

Although at the time of this writing, June 2006, the ICOM America website, www.icomamerica.com, still had no mention of either the 1500 or the 2500, the 1500 is readily available from US ICOM dealers along with details on the 2500. Icom told *MT* it should be on the web site by July, but if not, you can go to ICOM's Japan worldwide site at www.icom.co.jp/world/products/receivers/index.htm for official details on the new receivers.

❖ The Comparison

These ICOM receivers are highly capable, many-functioned pieces of sophisticated equipment. So we'll hit just some of their features, which differentiate one from the other ... or which make them very similar. I know I was surprised with some of the side-by-side comparisons. These were done on a Pentium III 1GHz, 256MB RAM, running Windows XP.

It was fortuitous that last month we looked at the PCR-1500, since it has become the new "basic" PC receiver at ICOM. The PCR2500 appears to be based on the 1500 with some added hardware and features. (More on the 2500 later.) Let's first concentrate on looking at the PCR-1500 versus the PCR-1000. To simplify our task, we'll break the comparisons into hardware and software.

❖ Hardware Comparisons

Lots of similarities here. Both the 1500

and the older 1000 use a triple conversion super-heterodyne circuit approach. They share common intermediate frequencies of 266.7 MHz, 10.7 MHz, and 450 kHz. Their modes of operation include AM, USB, LSB, CW, FM-N and FM-W. Both can utilize the optional UT-106 digital signal-processing module to implement Automatic Notch Filter (ANF) and Noise Reduction (NR) functions. A 20dB RF attenuator, noise blanker, Automatic Frequency Control (in FM mode) and Automatic Gain Control are hardware-based features common to all the PCR receivers.

One major difference is the receiver's computer interface. The PCR1000 uses the relatively slow (and sometimes difficult to configure) serial port. In contrast, the PCR1500 uses a much faster, auto-detecting USB connection. Audio, as well as data, can be sent via the USB port connection.

Another big difference is their frequency ranges. The PCR1000 goes from 0.01 to 1300 MHz, a range that amazed me when it was introduced. The PCR1500 more than doubles the PCR1000 range to 3299.999MHz – but at a price?

What Price Frequency?

ICOM has chosen to use a downconverter to get the extended frequency range. This methodology uses an "add-in" module at the antenna that reduces, or converts, the higher incoming signal to a lower frequency. This can then be received and demodulated by the base receiver block. This approach allows expanded frequency coverage with a minimal of hardware redesign, since the base receiver can remain the same.

Its downside is that the added circuitry and associated signal path usually leads to a loss of sensitivity. From the increased size and weight of the 1500 as compared to the 1000 (see Table 1), some hardware has been added.

Again looking at Table 1, under the Sensitivity heading we can see that indeed the sensitivity of the 1500 is

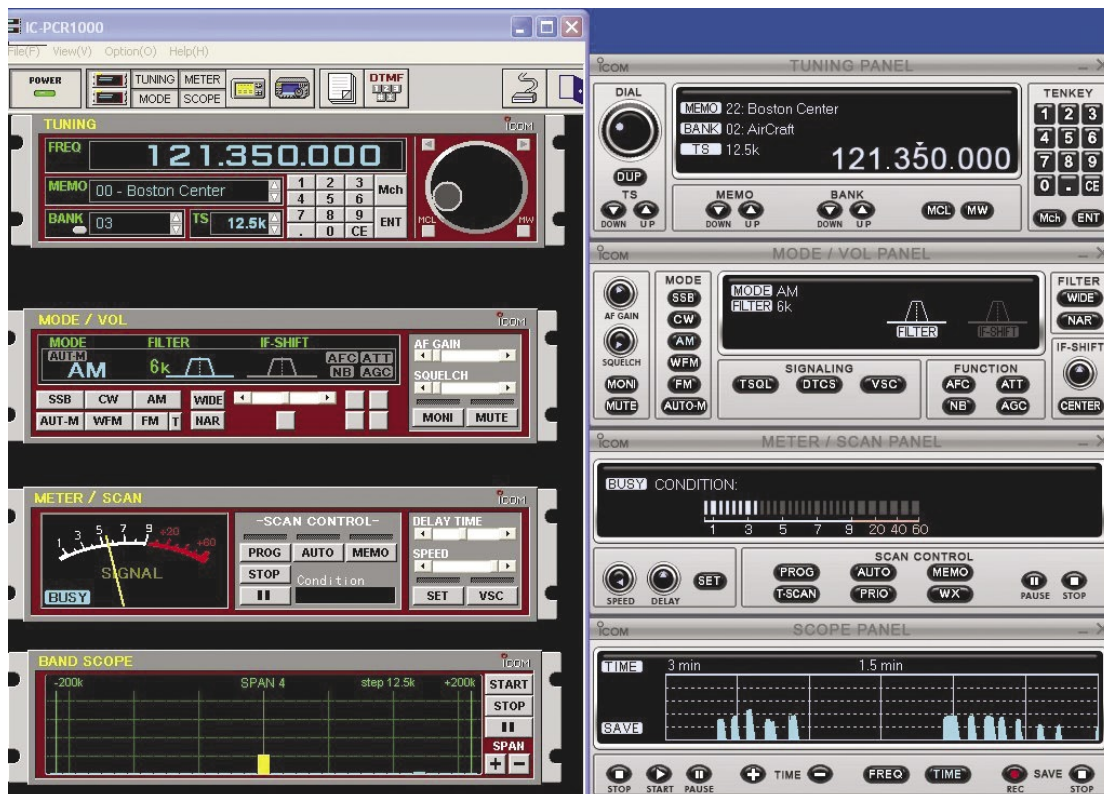


Figure 1 – Side-By-Side: Left PCR1000-Right PCR1500. Notice PCR1500 Time-line Scope function in operation at bottom right.

lower than the 1000 by an almost consistent 0.2 microvolts. In most frequency ranges this is almost a 50% reduction in sensitivity. Of course, sensitivity alone is not the whole story of how a receiver will perform. However, rarely is a lower sensitivity a good thing, especially at these usable levels.

If you check the ICOM America website, which defines the sensitivity of the PCR1000 across its frequency range, you may see a problem in the specs. The frequency ranges listed are 0.5 to 1.799999 MHz, 1.8 to 29.99999, 30 to 49.99999, 50 to 59.99999 and 700 to 1300.

Perhaps the 59.99999 should be 699.99999 so that the spectrum is continuous. In Table 1 we have surmised that this is the problem and have modified what ICOM America is reporting. If this assumption is incorrect, then ICOM has an even bigger issue, since it left out sensitivity data for a major portion of the PCR1000 range. In either case, it's another sign of inattention to Icom's online product listings.

❖ Comparing Software Packages

Software is provided by ICOM for all the PCR receivers. But the PCR1000 comes with added software, the very capable Bonito soft-

ware package. However, to compare apples to apples, we used the ICOM PCR1000 V2.2 software as our baseline. Again we'll compare the 1000 to its heir apparent, the 1500.

PC Requirements

All ICOM PCR programs run under Windows 98SE through Windows XP. I've had earlier versions of the 1000 software running under Windows 3.1 and 95. Table 2 compares the software capabilities of each receiver. The first thing to notice is the *huge* difference in computer requirements. The PCR1000 *minimum* PC is a 486DX4 with only 16 MB of RAM and a serial port. That's not much more than an abacus. The recommended system is a Pentium I 100 MHz.

In contrast, the 1500's (and 2500's) minimum PC requirement is a Pentium3 450 MHz with 128 MB of RAM, a far more powerful PC. The recommended system is a Pentium 4 and 256MB of RAM. This is a major increase in computing power.

Software Similarities

If you're comfortable with the PCR1000's ICOM version 2.2 software, you'll feel right at home with the PCR1500 and probably the 2500. If we look at Figure 1, showing the two operating side-by-side in the Component rack, the subtle differences in the software presen-

tation are apparent. However, overall they are very, very similar. All the PCR software packages have the familiar ICOM three interfaces – Component rack, Communications Receiver and Simple Scanner – for receiver control.

The 1000 and the 1500 both have a real-time Bandscope (Bandscan) function that shows the band activity centered around the current operating frequency. The 1500 Bandscan operates much smoother with more than double the frequency span range. Unfortunately, the annoying muting of the audio during Bandscan operation in the SSB or CW modes is still a "feature" of the PCR 1500 and 2500 software.

Other common and welcome software features include IF shift, VSC (voice scan control), S-meter squelch, and tone squelch, to name a few. On the PCR1500 and 2500 data sheets, decoding of DTMF tones is a highlighted feature. However, although not mentioned specifically on the PCR1000 data sheet, its software is also capable of DTMF decoding.

Viva La Difference

Two software features of the 1500 that showcase the greater PC power, are the Multi Channel Monitor and the Time-Line Scope. The Multi Channel function allows monitoring up to 25 channels, tracking S-meter levels of each channel. See last month's article on the PCR1500 for figures and details of this function.

Although all PCRs can perform the Bandscope function in some fashion, only the 1500 and 2500 have the Timeline Scope function. The Timeline Scope graphically displays and stores the band "happenings" within a 3 to 100 minute time period.

See the bottom right side of Figure 1. Here we can see the activity on this frequency for Boston Center over a period of a few minutes. Also look at the peak at the center of the PCR1000 Bandscope, on the lower left side of Figure 1, which was simultaneously monitoring the same frequency. Two radios working together: What a *great* idea.

More Soft Power

Although audio recording was possible with the PCR1000, it required a separate cable between the 1000's audio output and the PC's soundcard. Both new receivers utilize the USB port for audio input and therefore only require a single cable. However, if you perform a USB audio transfer and don't have at least the recommended PC hardware, be prepared for a chopped-up, useless recording.

Other 1500 functions include: CTCSS/DTCS tones and duplex mode operation for monitoring a repeater, pocket beep function, weather alert function and tuned bandpass filters for VHF/UHF bands. The PCR1000's limit of 1000 channels per file has been increased to 2500 channels on the 1500.

❖ Enter the PCR-2500

The PCR-2500 has the same physical

TABLE 1: HARDWARE COMPARISON

Specs	PCR1000	PCR1500	PCR2500
Circuit SuperHet Triple Conversion	Yes	Yes	Yes
IF Freqs: 266.7MHz/10.7MHz/450kHz ...	Yes	Yes	Yes
Frequency 0.010–1300MHz	Yes	Yes	Yes
Frequency 1300–3299.999MHz	No	Yes	Yes
Noise Reduction & Auto Notch	UT106 Req ...	UT106 Req	UT106 Req
Size (Inches) approx.	5x1.2x7.9	5.75x1.5x8.1	5.75x1.5x8.1
Weight (lbs)	2.2	2.6	3
Modes of Operation			
AM, SSB, CW, FM-N, FM-W	Yes	Yes	Yes
D-STAR DV	No	No	UT118 Req
APCO P25	No	No	UT122 Req
Dualwatch Capability	No	No	Yes
Diversity Receive	No	No	Yes
Sensitivity (10 dB S/N) μV			
1.8 - 29.99999 MHz - SSB/CW	0.28	0.5	0.5
30 - 49.99999 MHz - SSB/CW	0.35	0.5	0.5
50 - 699.99999 MHz - SSB/CW **	0.2	0.4	0.4
700 - 1300 MHz - SSB/CW	0.25	0.5	0.5
1300 - 2299.999 - FM	N/A	5.6	5.6
2300 - 3000.000 - FM	N/A	18	18

** See Text

TABLE 2: SOFTWARE COMPARISON

PC Requirements	PCR1000	PCR1500	PCR2500
CPU Requirements	486DX4	P3 450MHz	P3 450MHz
Minimum RAM	16 MB	128 MB	128 MB
USB Port	No	Yes	Yes
Serial Port	Yes	No	No
Monitor Resolution Min	640x480	1024 x 768	1024 x 768

Software Features/Functions

Three Receiver Screen Modes	Yes	Yes	Yes
Bandscope	Yes	Yes	Yes
Time-Line Scope	No	Yes	Yes
Multi Channel Monitor	No	Yes	Yes
Recording	Yes	Yes	Yes
DTMF tone decoder	Yes	Yes	Yes
Weather alert function	No	Yes	Yes

size as the PCR1500, but is almost half a pound heavier. From the data found on the ICOM Japan website, this receiver appears to be composed of a PCR-1500 and a second receiver, or "sub-receiver." The main 2500 receiver does everything that the 1500 does and more. The 2500's "sub-receiver" only covers 50–1300 MHz in AM, FM and WFM modes. See Figure 2.

The 2500's sub-receiver, with a second antenna, can be put to good use as a diversity receiver. In the diversity mode, the PCR2500 continuously compares the signal strength from both receivers and selects the one that maintains the highest sound and signal quality.

If you are not using the sub-receiver in the diversity mode, it can be used to simultaneously monitor frequencies or frequency ranges. Of course a second antenna is required, and the sub-receiver's mode and frequency range is limited as stated above. This "Dualwatch Capability" makes the PCR2500 much more powerful than any a single receiver and you can imagine the software possibilities.

Clearly, with the additional hardware and high-power PC capabilities, comes the potential of new features and functions. I think the PCR2500 has the potential to perform some amazing monitoring feats.

❖ More Modes, More Money

With the addition of the optional UT-122 P25 digital unit, the 2500 becomes capable of decoding the APCO P25 digital mode which has become common on VHF/UHF for government, military and law enforcement transmissions. However, the radio does not have the ability to follow trunked systems.



Figure 2—Seeing Double. The PCR2500 in DualWatch Mode. Notice the two frequencies 145 and 430 MHz being monitored simultaneously.

The ICOM Japan site has details on the IC-PCR2500 and its optional D-STAR mode – a new ham radio system that offers digital voice and data communication that ICOM is pushing. However, the 2500 requires yet another optional unit for it: UT-118.

Like the PCR1500, the PCR2500 comes in a standalone form – the IC-R2500 – that has a faceplate full of mechanical controls and does not require a computer for its operation. This feature costs an additional \$140 to the price of the PC controlled radio.

❖ Keep the 1000 or Go for the 1500?

After using both the PCR1000 right next to the PCR1500 for a few weeks, I've come to some personal conclusions. On the plus side for the 1500, I really like the USB port convenience of the 1500, data and audio with one simple click.

However, as reported last time, the measured scanning rate for the PCR1500 on a Pentium 3, 1 GHz PC was only slightly faster than the PCR1000, not enough to make a great difference. On-air listening tests, as arbitrary as they are, confirmed ICOM's sensitivity specs. The 1000 and 1500 were very close in sensitivity, with the 1000 having a tiny edge.

The Multi Channel feature is very nice, but in order to hear a channel, scanning must be manually stopped by clicking on the channel-box to be monitored.

True, the PCR1500 and PCR2500 cover 2000 more megahertz than the PCR1000. If you have a specific need to monitor above 1300 MHz, then they may be just right. But, in the words of a famous monitoring personality, quoted on the Internet, "...in our entire history, I don't remember a single logging being reported above 960 MHz. At those frequencies range is very limited, almost all communications are by data and voices have been digitized."

I have to agree. To be fair, that statement was made a while ago. However, after three weeks of scanning 1300 to 3300 MHz and finding only three frequencies carrying clear audio, I must agree with the essence of the quote.

Next, I reflected on the amount of great 2nd party software available for the PCR1000, such as PCR Talker. Then consider the very inexpensive standalone possibilities available by using a Palm Pilot and PCR Pilot software with the PCR1000. (Both these programs are free, but are no longer sup-

ported and may be hard to find. Try the Yahoo groups PCR1000 and TalkPCR for manuals, programs and lots more.)

I've never been the sort of reviewer who sees every new product as "the best thing since sliced bread." All things considered, with the base price of the PCR1500 being \$695 list (\$580 street price), as compared to a like-new used PCR1000 averaging \$320 on Ebay, I'll be happily keeping my PCR1000 and enjoying every minute of listening.

In my opinion, a used PCR1000 is still the best value for the money for a PC controlled wideband receiver. When the price of the PCR2500 comes closer to \$500 from its current \$850 street price, I'll reconsider ... just maybe.

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First Look at the Eton E5 Portable

By Jim Clarke NR2G
jimclarke@monitoringtimes.com

Just when I thought there were plenty of portables on the market to choose from, Eton Corporation has added the E5 to the line-up. I must admit, when I took it out of the box, I wasn't all that impressed. I mean, if you've seen one low-cost portable, you've seen just about all of them. But then the little things that Eton has done caused me to look at the little radio differently, as you will see.

❖ First Glance

Measuring in at 4"H x 6.5"W x 1"D, the E5 is about the size of paperback book, and has a reasonable number of controls on the front-panel to match its size. One of the first things that impressed me was that all buttons on the front-panel have the label for their primary function on their face, not the radio; not only are they on the button, but they are illuminated by the backlight – perhaps a minor thing to most, but very helpful when using it in low light or in the dark.

The LCD multi-function display is about 1.25"H x 2.5"W and displays operating information such frequency, mode, signal strength, etc. The E5 is another one of the newer portables in which user-input acts as a trigger to turn on the backlight. The backlight stays on for 15 seconds while using batteries, but remains on when powered by an external adapter. A dedicated Light button is also provided.

The E5 covers 500 kHz to 29,999 kHz continuously as its AM band, and then 87.5 MHz to 108.1 MHz as its FM band. In the AM band, you can receive AM and SSB signals, but only FM mode (stereo or mono) in the FM band. While in FM, stereo output is available for the included set of earphones.

❖ Ergonomics

Due to its size, right-handed folks will have no trouble accessing all of the front-panel buttons using their right thumb.

The Lock button on the E5 works a little different from what I'm used to: with the E5 Off, the Lock prevents accidental power-on, but when the E5 is On, an initial press of the Lock button puts the radio into "Hold" mode, and pressing again locks all front-panel buttons. While in "Hold" mode, the frequency is locked, but all of

the other controls are available. Once again, this is a relatively small thing, but it does add a nice option to the typical "all or nothing" locks of the past.

Unfortunately, I was unable to try the "audio-mute" function referenced in the "Lock" section of the Operation Manual. Eton mentions the mute feature, but never really elaborates on how to use it. Also, the manual mentions the On/Off power-switch is disabled when the radio is in "Hold" mode, but I found that not to be the case.

The speaker in the E5 is a little over 2" in diameter and has surprising audio for something so small. Obviously, it is lacking in bass response, but what it does project is clear and crisp, as observed while listening to some classical music stations.

Only one clock is provided with the E5; however, it does allow you to set the time zone; what you end up with is what I'll dub a "dynamic-clock." Once you've set the time and day-of-the-week for your location, you can easily change the time zone to view the time/day virtually anywhere in the world.

❖ Warning Sign?

I usually downgrade my expectations whenever I see a "reset" button on a communications product. In my experience, this typically indicates marginal operating software that occasionally "locks up" the radio. Unfortunately – or fortunately, depending on your perspective – the reset button is on the front panel of the E5. And it was fortunate for me it was on the

TABLE 1. RECEIVE SENSITIVITY

AM 10dB (S+N)/N	
Frequency (MHz)	Level (uV)
0.5	1.73
2	1.18
6	0.83
9	0.85
12	0.71
17	0.87
21	1.33
29	2.45

front-panel, as I needed it four times over the course of this review: once after changing the batteries, and three times during what I would consider to be normal operation.

❖ Changing Frequency

The operating frequency of the E5 can be changed using one of the following five methods: numeric-keypad entry, Up/Down step buttons, the tuning knob, memory-recall, or Auto-Scan.

Numeric-keypad entry is very simple: just type the frequency in kHz for AM band frequencies and press AM, or enter the frequency in MHz (not including the decimal point) for FM band frequencies and press FM.

The Up/Down step buttons change the frequency by 3 kHz from 150 to 520 kHz, by either 9 or 10 kHz from 520 to 1710 kHz, by 5 kHz from 1710 to 29995 kHz, and by 100 kHz from 87.5 to 108.1 MHz.

Dimpling on the Tuning-knob helps to keep the index finger from slipping off while dialing across the band in either 1 kHz steps from 150 to 29999 MHz, or 25 kHz steps from 87.5 to 108.1 MHz. And, I am happy to add, there is no "chuffing" while tuning with either the tuning-knob or using the Up/Down step buttons.

Memory channel reception is as easy as selecting a memory page using the Page/Time button, then pressing the F-key that corresponds to the channel number on that page. The current Page can be selected using either the Up/Down step buttons to scroll to the desired Page, or by entering the Page number then pressing the Page button. The E5 is equipped with 700 memory channels divided into 100



pages of 7 locations.

Auto-Scan provides three different modes of operation: Stop, D-5, or ATS. In Stop mode, the radio stops and stays on the first station encountered; D-5 mode pauses the E5 at each detected station for 5 seconds and then resumes scanning. ATS stands for Auto-Tuning Storage mode and stores the strongest local FM stations received during the scan.

❖ Sleep and Auto-On

For those of us who like to fall asleep to our favorite radio station, the E5 has a sleep function. It can be set from 1 to 99 minutes by either using the keypad to enter a value and pressing the Sleep button, or by pressing the Sleep button and then using the tuning knob to select the minutes. The Power button is used for radio On/Off and also for enabling the Sleep timer when held down.

If you like to be awakened by your radio, or you want it to turn on automatically, Eton provides four alarms. Available settings for each alarm are alarm-time, weekday, volume, playtime, and memory-location.

❖ Antennas

The E5 comes equipped with three antennas: a built-in ferrite-core bi-directional antenna, a 36" swiveling telescopic whip antenna, and an External Antenna jack.

❖ Other Jacks and Controls

For those who like the ability to reduce the sensitivity of the radio, there is a Local/DX

switch. Typically, the only time I find this feature necessary is when connecting the radio to a large external antenna.

There is a Wide/Narrow bandwidth switch, but as is all too common on receivers in this class, the Narrow position is just too narrow. This seems to be a historical trend, only contradicted recently in my personal experience by Radio Lab's Super-909 – which I would consider the best filter combination I've heard in recent years.

Single Sideband (SSB) reception is enabled via a button on the front-panel. In my humble opinion, it seems to me manufacturers should just drop the SSB reception on radios with tuning step sizes greater than 100 Hz. Tuning around in the "Ham Bands" can be frustrating with a 1 kHz step. Even though the fine tuning can compensate for the spread, it just seems too large, adding to "listening fatigue."

A knob on the lower right side controls audio volume, and there is a jack for connecting an external 9 Vdc power source.

❖ How Does It Play?

Shortwave reception with the E5 was quite nice for a radio of this size. Sensitivity was very good and selectivity was acceptable. Reception indoors was acceptable with the whip, and when connected to my Loop Sky Wire seemed to handle the higher signal levels well.

AM broadcast band listening was also good, with the selectivity providing good

rejection of strong, local, adjacent channel signals. The built-in ferrite antenna provides a degree of directivity, giving the listener the possibility of interference reduction, depending on the locations of the desired and interfering signals.

One of the ways I check an FM radio is to try to pick up CFMX in Toronto, Canada, with only the indoor whip antenna. I am happy to report the E5 grabbed the classical music station with a full-quieting signal and had good audio, despite its size. Most receivers I test either don't pick CFMX up at all, get bleed-over from an adjacent signal, or include a fair amount of "bacon-fry" noise on the signal.

There was one surprisingly absent feature in FM, though; there is no signal strength indicator. I don't know about your preferences, but I missed it.

❖ Final Thoughts

I found the E5 to be a refreshing improvement over the G4000A, and in fact I would take one E5 over two G4000As. Its small size and very good performance, combined with the little considerations here and there, such as the lighted button labels, really warmed me up to this new offering from Eton. If I didn't have the money to pick up a Super-909, I would probably go for the E5.

The Eton website, at www.etoncorp.com, lists the E5's price at \$150 US dollars. Grove Enterprises also offers the Eton E5 as Rev10 for \$149.95. For more information, visit their website at www.grove-ent.com.

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Spyware: Get Rid of It for Free

I'm sure you have heard of the term Spyware. We covered it a number of years ago in this column. However, recently it seems the problem is becoming exponentially worse. These insidious, uninvited programs can do some terrible things to the gateway to your monitoring, your PC. In fact, in the worst case, they can have an effect on your whole life by "hijacking" your personal data, leading to identity theft. (And you thought that your monitoring software running very slow was a pain!)

❖ What is Spyware?

Spyware is not the same as a computer virus. A virus's main objective is to corrupt, destroy and infect other PCs. Spyware has a very definite and sneaky goal of information transfer. In most cases, it attempts to work without any indication of its existence.

Spyware is defined at the free Internet encyclopedia, Wikipedia, (<http://en.wikipedia.org/>) as, "... a broad category of malicious software designed to intercept or take partial control of a computer's operation without the informed consent of that machine's owner or legitimate user."

To me, the worst aspect of spyware is that acts like a stealth program. It clings undetected and uninvited to a program or an email that a user opens. It is found on freeware disks and CDs. Once in, it installs itself and sucks information and computer power from you and your PC.

Interestingly, these applications were initially conceived of as a marketing tool. The concept was to target advertisements to the interests of the user. In fact, some of the first programs were called adware. One of the

anti-spyware programs we will use still builds on this name.

Human nature being what it is, some programmers decided that they could "expand" on adware's functionality. The expanded capability of looking over the shoulder of the Internet user became too alluring to the sales and marketing community to voluntarily limit its use. Instead of helping lead users to products based on their surfing habits, these bad guys evolved into programs which force-fed unwanted and unrequested pop-up ads and ad pages onto users' screens. As they say, the road to hell is paved with good intentions.

An even more evil ploy is spyware which poses as something else to get the user to click on it – even free anti-spyware! This is a common trick used by virus programs, which are a close cousin to spyware.

❖ "Click Here To ..."

If you do any surfing, you'll come across boxes promising everything from money to free programs. All you have to do is "Click Here." Many of these are valid advertising gimmicks. However, some should really say, "Click Here To Load Up On Spyware." That's exactly you get when you click them.

Remember that the Internet economy is based on receiving money for every click on a product or website. Therefore, users clicking off a website that they have been forcibly sent to by spyware, puts money into the spyware author's pockets.

The motivation for spyware is money for those without business ethics. For the truly dishonest, users' personal and financial data is their ultimate spyware target.

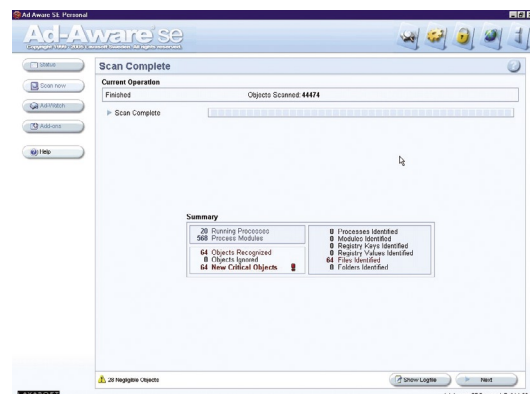


Figure 2 - Files Scanned 44474 - 64 Bad Guys Captured and Removed By Ad-Aware SE Personal

pages surfed.

Cookie use was later expanded to include personal information, such as website log-in name. Then some programmers stepped over the line of decency. Using similar programming, they added the ability to track and report your browsing of client's competitors' websites. And this was just the start of purposeful invasion of privacy.

Today, some spyware can actually block or hijack your PC by redirecting your browser to a site. Remember, all this is without your knowledge or approval. Far worse, spyware has been implicated in the criminal business of "phishing." Phishing, a variation of the word "fishing," is when criminals send you an email posing as a legitimate site that you do legitimate business with. It can be your bank or Paypal. The email asks you to input personal financial for some bogus reason, such as to verify their records. If you fall for it, the phishing expedition can yield the crooks some big financial fish at your expense. It has been reported that the information gleaned from spyware is being used to personalize phishing emails, making them more believable.

Welcome to the new Internet economy. I have had over twenty phishing emails over the past two years. When in doubt DON'T Email any personal or financial information if requested by an email. Telephone the supposed requestor, using their normal telephone number. They will tell you if the email was from them or a phishing expedition.

Other bad things that different types of spyware can do include allowing people to track your on-line shopping habits, catalogue keywords you inquire about with your search engine, track your on-line financial sites,



Figure 1 - Lavasoft's Excellent Ad-Aware SE Personal's Startup Screen

❖ Watch Your Cookies

One class of spyware uses cookies – a small bit of memory that stores details of your browsing. When you access a website, it stores a cookie on your PC. When you return to the website it reads the data in its cookie. The original purpose for cookies was to customize the website to the your interests. This was based on your past use of the site, such as the products and

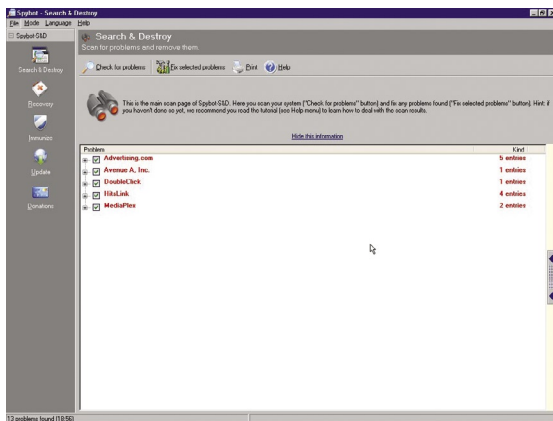


Figure 3 – Spybot: Search & Destroy – Simple and Excellent Startup and Results – 5 More Bad Guys!

intercept pass words and more. Having your identity stolen is among the most devastating end results.

As we now know, spyware comes in many forms – data-mining, adware, worms, Trojans, dialers, malware, browser hijackers, active cookies and others. We will refer to them as what they really are: bad guys.

❖ PC Slowdown = Trouble

Not all programs running on your PC are visible on your monitor. Many legitimate assisting programs are waiting their turn, running in the background while other programs are displayed on your screen. However, every background program takes CPU power, making all programs run slower. They can also cause the display refreshing to slow down or stop for periods of time.

OK. So maybe we now know why the zip has gone out of your PC. Why programs take longer to open and run. Why radios begin to lag their keyboard commands. Why search and editing frequency databases require a bathroom break to complete. Your PC could be loaded with bad guys (spyware).

❖ Fighting Back

You may erroneously assume that the major anti-virus program companies produced the first anti-spyware programs. On the contrary, they were developed by individual programmers and small companies and were provided to the public free of charge. Recently, due to

the wild increase in the number of spyware programs, the anti-virus companies have smelled the money and jumped in.

Two of earliest anti-spyware programs are still around, still free and considered some of the best available. They are Ad-Aware and SpyBot: Search & Destroy. We'll look at the free version of both of these and the anti-spyware that is included with the Netscape 8.1 browser. These programs will work with Windows operating systems from 98SE to XP.

❖ Why More Than One?

As we will see, different anti-spyware programs detect and remove different spyware. Therefore, by using a few anti-spyware programs you can cover most possibilities. Let's try them out.

❖ Ad-Aware- 1st Try

Ad-Aware SE Personal by Lavasoft is first up on our PC. It claims it "...provides advanced protection from known data-mining, aggressive advertising, Trojans, dialers, malware, browser hijackers, and tracking components." Figure 1 displays its easy to navigate startup screen. Here the user can perform a number of functions, including downloading updates, viewing a summary of use, reading the Help manual and starting a new scan.

After clicking Start, the user is given a scan choice, either Full or Smart. The Smart scan is quick, taking only a minute or so, depending on the number and type of files in your PC. The Full is more thorough, but takes considerably longer than the Smart scan.

Figure 2 shows the shocking results of a Smart scan. After scanning 44,474 objects in my PC, 64 "New Critical Objects" were identified by Ad-Aware.

Details of each object can be viewed on another screen. The program allows the user to delete any of these items from your system. To clean your system, all the "Critical" objects should be deleted. Congratulations, you have launched your first attack on spyware.

❖ Spybot - Our Next Wave

Next run Spybot: Search & Destroy by clicking on "Check for problems" seen at the top of Figure 3. This program was the first one I ever used and still is one of the best. It was developed and is maintained by one individual, Patrick M. Kolla. Figure 3 also shows the results of the scan.

Spybot takes about five minutes to run on my older system. As you can see, Spybot has discovered five *more* problem objects! Details of each problem are displayed by clicking them.

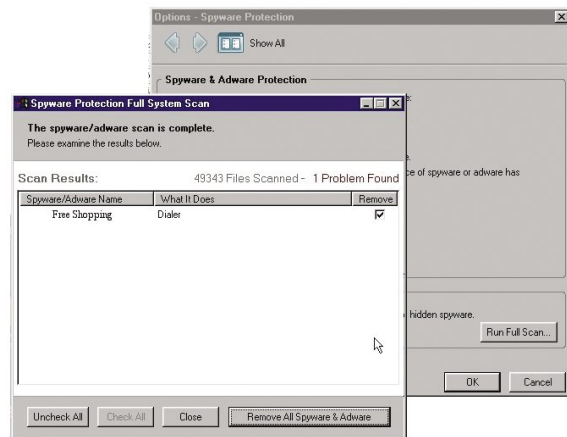


Figure 4 – Netscape 8.1 Finds Yet Another Bad Guy.

Selecting "Fix selected problems" will delete these five bad guys. Spybot is very simple to use and does a consistently excellent job. Although it is offered for free, if you find it useful, I encourage you to donate a few Dollars/Euros to Mr. Kolla's effort.

❖ No escape from Netscape

Well, we have used two anti-spyware programs to flush the bad guys and you'd think we'd be clean. But let's try one more. Another browser that I use is Netscape 8.1. This browser uses both Firefox and Internet Explorer engines. It also has a built-in security suite, which includes an anti-spyware function. The result of running this is shown in Figure 4... and yes, another bad guy has been found!

Yet another anti-spyware that is getting great reviews is Microsoft's Windows Defender (Beta 2). However, this program is for Win 2000 & XP only. Currently it can be downloaded free of charge.

❖ Caught in the Act

We have been talking about finding and removing "bad guys" once they have become resident in our memory, hard drive, disk and Windows Registry. Another approach is to catch them in real-time as they are downloading to your system. Netscape 8.1 includes this real-time capability. However, you should run it on at least a Pentium III, 1 GHz or you may experience long download times due to real-time file examination.

Due to possible program conflicts that may lock up your system, make sure that only one anti-spyware program is running at a time. Make doubly sure that they are not running in the background, except one at a time. See the Help file in each program for more details on this subject.

❖ Results and Maintenance

If you are obsessive compulsive, you can re-run all the anti-spyware programs again. Or we can assume that we have reached a level of anti-spyware comfort.

If you've removed lots of bad guys, then you should see a marked improvement in the speed of your system. Now *finally*, go and enjoy using your PC for some great (and fast) radio monitoring.

Depending on your browsing habits, you should re-scan your system after five to eight hours of use. However, if you do lots of surfing to unknown sites or have a click-happy-finger, be prepared to do a daily anti-spyware scan.

DOWNLOADING THE GOOD GUYS

Ad-Aware
www.lavasoft.de/software/adaware/
 Spybot: Search & Destroy
www.safer-networking.org/
 Netscape 8.1
<http://browser.netscape.com/ns8/>
 Microsoft's Windows Defender
www.microsoft.com/athome/security/spyware/default.msp

What's NEW

Tell them you saw it in Monitoring Times

VHF/UHF Scanner on a PCI card

WiNRADiO Communications announces its new software-defined VHF/UHF scanning receiver on a PCI card. This new device draws on WiNRADiO's experience with its third generation ("G3") range of software-defined HF receivers to extend the SDR concept to VHF/UHF frequencies. The entire receiver is contained on a 2/3 length standard PCI card and will fit in most modern PCs.



The new WR-G305i receiver features a frequency range of 9 kHz to 1800 MHz (less cellular frequencies where required by law), multiple squelch modes (signal level, noise content, voice, CTCSS and DCS), high scanning speed (up to 60 channels/second), excellent sensitivity and typical 90 dB dynamic range with a standard PC sound card. Other features include a real-time spectrum analyzer, tuning in 1Hz steps, and accurate signal-strength meter.

Optional add-ons can add numerous features to the basic radio. WinRADiO's Trunking Option will enable following Motorola SmartNet® and MPT1327 trunking networks. A 3.3 GHz external down-converter can extend the frequency range. The optional Professional Demodulator software introduces additional demodulation modes, continuously variable IF bandwidth, user-adjustable filters, and interactive diagrams of the digital demodulator structures. The DRM module adds Digital Radio Mondiale demodulation, if those signals exist in your area on VHF/UHF. One add-on – the Wide FM Option – is factory-fitted hardware and should be specified at the time of purchase.

This affordable receiver (\$519.95 from Grove Enterprises)

is targeted at radio scanning enthusiasts and monitoring professionals interested in leading edge digital radio technologies. WiNRADiO will support this receiver with a broad range of additional digital signal processing tools, as well as third party application development support.

For more information about the new WR-G305i receiver, visit www.winradio.com/g305 or www.grove-ent.com or call 1-800-438-8155 in the U.S.

MFJ 6-Band Rotatable Mini-Dipole

The MFJ-1775 is a low profile 14 feet, with a 7 ft. turning radius, it covers 40, 20, 15, 10, 6, 2 Meters and handles 1500 Watts. Its directivity focuses your signal and reduces QRM/noise. You can hardly see this mini 14 foot rotatable dipole across the street!



Its short turning radius fits on the smallest roof – it's perfect for town houses, apartments and condos. The MFJ-1775 is inconspicuous and low profile – not much bigger than a TV antenna and can easily be turned by a lightweight TV rotator.

It's no wimp, though! Its directivity reduces QRM/noise and lets you focus your signal in the direction that you want – so you can work some real DX. You can operate 6 bands – 40, 20, 15, 10, 6 and 2 meters – and run a full 1500 Watts SSB/CW on all HF bands!

The easy-to-put-together MFJ-1775 features automatic band switching and uses highly efficient end-loading with its entire length always radiating. With 6 and 2 Meters thrown-in, you have ham radio's most versatile rotatable dipole! Each HF band uses a separate, efficient end-loading coil wound on fiberglass forms with Teflon™ wire, and capacitance hats at each end (no lossy traps). 6/2 meters are full-length halfwave

dipoles.

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The MFJ-1775 is \$239.95. A variation on the antenna is the MFJ-1775W WARC band version for 12, 17, 30, 60 Meters only.

To order, get a free catalog, or for your nearest dealer, call 1-800-647-1800; write to: MFJ, 300 Industrial Park Road, Starkville, MS 39759; go online: www.mfjenterprises.com; or fax to: 1-662-323-6551.

Domestic Broadcast Survey 8

With hobbyists planning the upcoming DX season, here's a source to add to your listening post. The DSWCI (Danish Shortwave Club International) has recently issued the 8th Edition of their annual *Domestic Broadcast Survey*.

The 8th Edition, edited by DSWCI Chairman, Anker Petersen, as with past issues, is divided into four parts. Part 1: All active broadcasting stations on 2300-5700 kHz. Part 2: Domestic stations on international shortwave bands to a domestic audience. Part 3: All active clandestine shortwave stations listed with schedules and identifications. Part 4: Deleted frequencies between 2 and 8 MHz, which have not been reported heard during the past four years.



Information for this excellent source is gleaned from experienced worldwide hobbyists, DX bulletins, and official sources, including current A06 schedules when available. As with past edi-

tions, information is listed in an easy to follow format that includes frequency, kW, country, station, and operating schedules. Parallel frequencies, operating format and identifying slogans are listed when applicable.

The "Last Log" column assists the listener with listings of the last month and year the station was heard prior to the DBS publishing deadline. Active stations are listed in the 8th edition as A (Regular) B (Irregular) C (Sporadic) and D (likely inactive).

A free sample page to view in PDF format is available at www.dswci.org/. All buyers of DBS-8 will receive a username and password to receive the monthly updates on the tropical bands published as *Tropical Bands Monitored* on the DSWCI website.

The 40 page edition is primarily available by email in PDF format (about 330 kB). A limited number are also printed on paper. Funds should be sent to: DSWCI, c/o Bent Nielsen-Treasurer, Egekrøgen 14, DK 3500 Værløse, Denmark. Email edition: DKK 40,00 or US \$7.00 or Eur 5,00 or GBP 4,00 or SEK 50,00 or 5 IRC's. Printed edition: DKK 75,00 or US \$12.00 or EUR 10,00 or GBP 7,00 or SEK 100,00 or 10 IRC's. Payment by cash notes are accepted, whereas checks are not accepted. DSWCI Bank is Danske Bank, 2-12 Holmens Kanal, DK-1092 Copenhagen K, Account: DK-44 3000 4001 528459. Giro Account: DK 10 3000 007 103409 (add fee: DKK 30).

The *Domestic Broadcast Survey* 8th Edition remains a "must-have" source for the dedicated hobbyists. This fine publication has remained in my listening post for many years. It is useful, accurate and a valuable reference aid. Thanks to Anker Petersen and his dedicated band of listeners and monitors for an excellent resource.

– Gayle Van Horn

Books and Equipment for announcement or review should be sent to What's New, c/o Monitoring Times, 7540 Highway 64 West, Brasstown, NC, 28902. Press releases may be faxed to 828-837-2216 or emailed to Rachel Baughn, editor@monitoringtimes.com.

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